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A new geography of Canada

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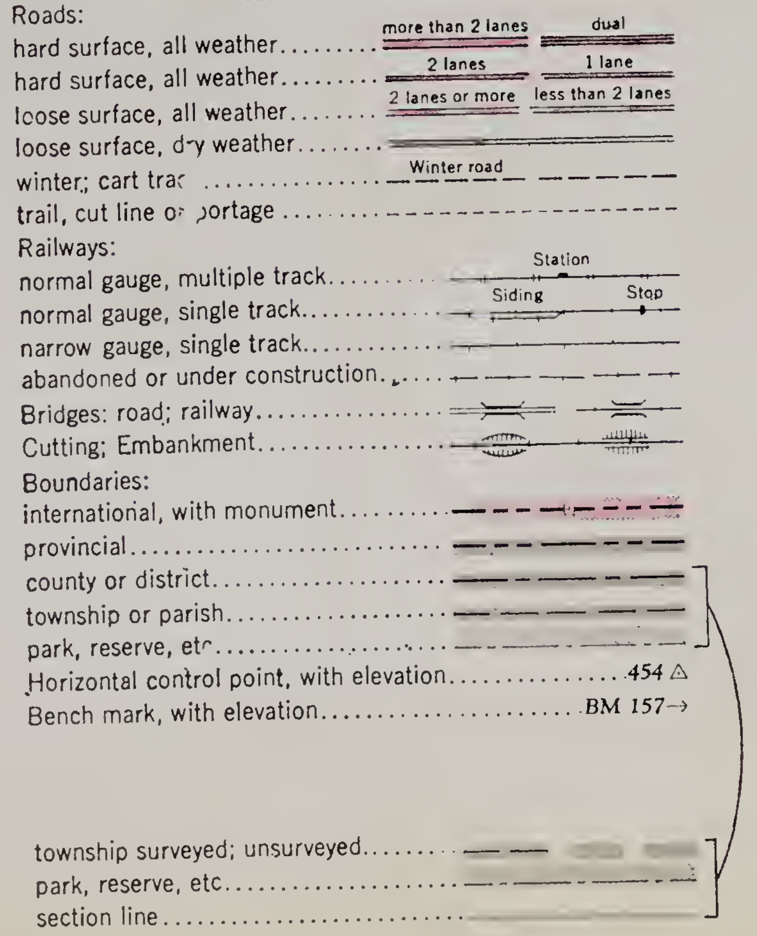

Roads:
hard surface, all weather
hard surface, all weather
loose surface, all weather
loose surface, dry weather
winter; cart track
trail, cut line or portage
Railways:
normal gauge, multiple track
normal gauge, single track
narrow gauge, single track
abandoned or under construction
Bridges: road; railway
Cutting; Embankment
Boundaries:
international, with monument
provincial
county or district
township or parish
park, reserve, etc
Horizontal control point, with elevation
Bench mark, with elevation

township surveyed; unsurveyed
park, reserve, etc
section line

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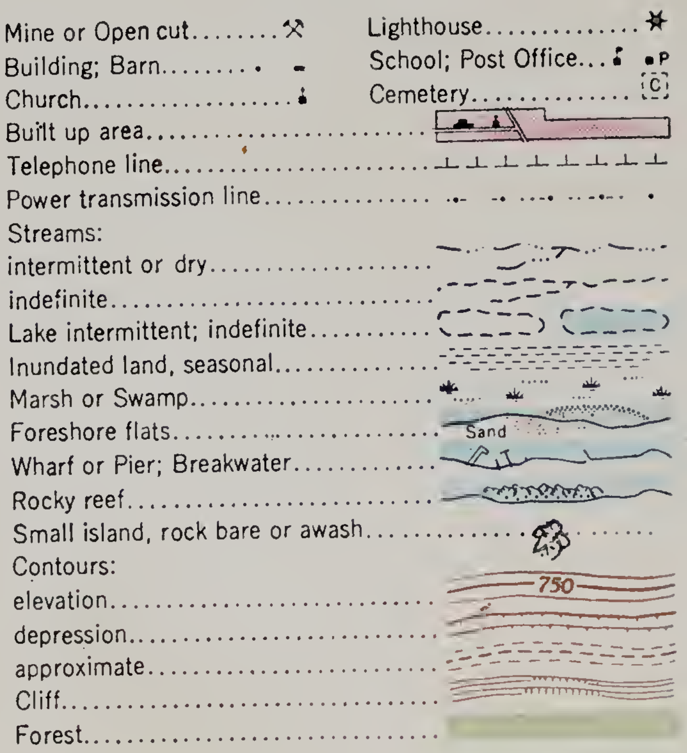

Mine or Open cut
Lighthouse
Building; Barn
School; Post Office
Church
Cemetery
Built up area
Telephone line
Power transmission line
Streams:
intermittent or dry
indefinite
Lake intermittent; indefinite
Inundated land, seasonal
Marsh or Swamp
Foreshore flats
Wharf or Pier; Breakwater
Rocky reef
Small island, rock bare or awash
Contours:
elevation
depression
approximate
Cliff
Forest

Substitute this boundary line block in D.L.S. areas.

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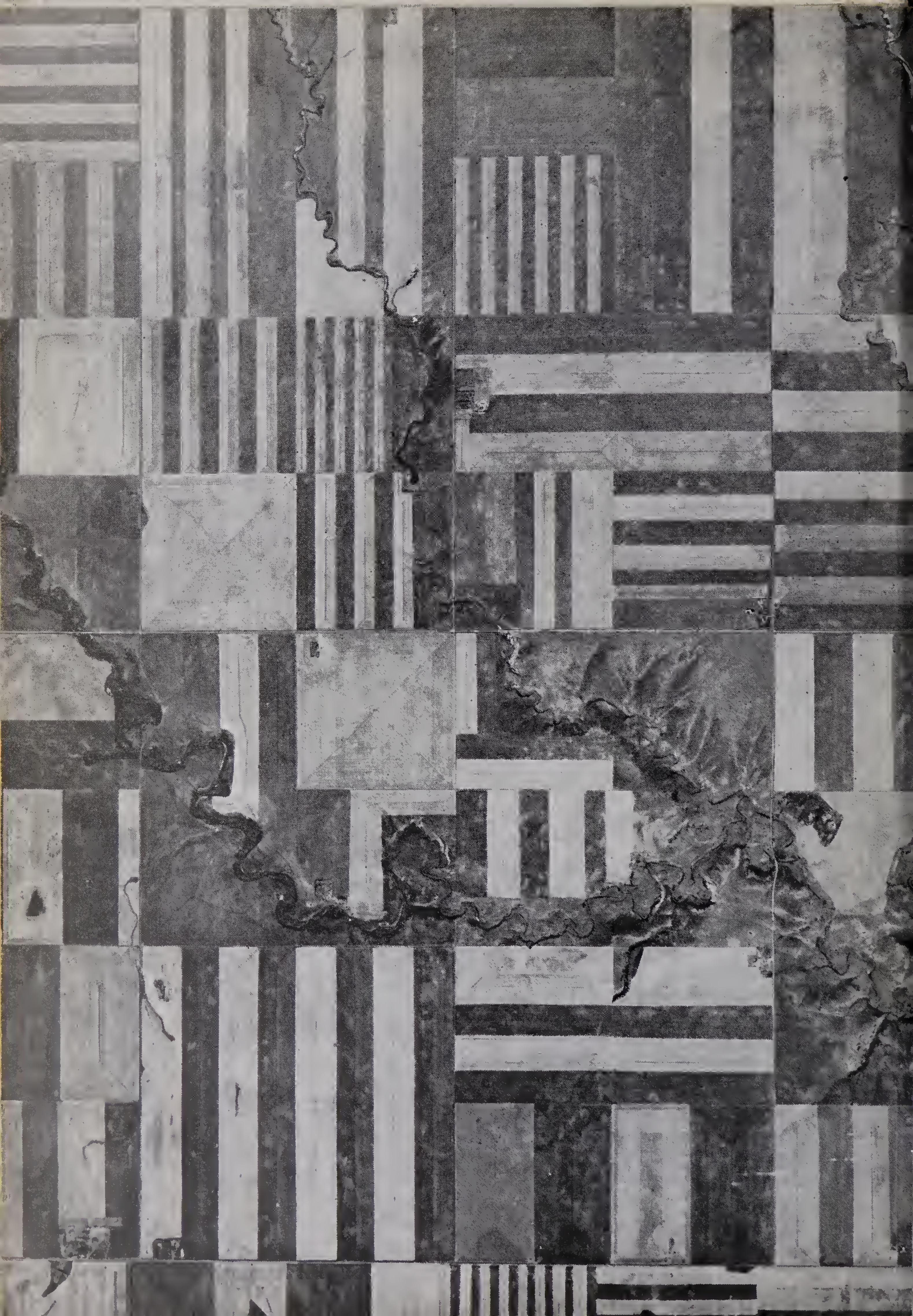
A new geography of Canada

The cover photograph, which also appears on the left-hand title page, is a vertical aerial view of part of the Dry Belt near Champion, Alberta. This is an excellent example of man's effect on the landscape and in turn the limitations put on man by the existing natural conditions. The lines of the survey system are easily seen, but notice how many times they are interrupted by some land formation. (R.C.A.F. photo)



A new
geography of Canada

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Preface

This book represents a new approach to school geography. Nearly ten years ago the International Geographical Union Commission on the Teaching of Geography in Schools made many suggestions for the improvement of school geography. One of these suggestions related to the need for new types of textbooks.

The Commission recommended that a textbook should supply a great deal of source material, as closely related to the living geographical landscape as possible. The present book includes carefully selected photographs of various types, large-scale topographic maps in full color, authentic, firsthand, vivid descriptions of scenery and life, graphs and statistics and field studies of various kinds. The latter include sample studies made by the authors themselves, as well as town planning studies and original investigations carried out by geographers in all regions of Canada.

Although each chapter may be primarily devoted to various regions of Canada, the chapter headings are not simply Alberta, Ontario, the Maritimes, — but refer to some special aspect of a developing theme or idea that is particularly well illustrated by one region or province.

Historical narrative is used as a descriptive element at the beginning of sections or chapters and is introduced mainly to present problems and ideas which can be explained with the help of geography. History in these circumstances is the handmaiden of geography. It is put in only when it is useful in promoting geographical understanding.

In using this variety of material, it is essential that the pupils be permitted to study and draw conclusions on their own. In this way, they practise and acquire the skills of the geographer. Geography becomes a true inquiry, an exciting, experimental laboratory subject, bringing vivid reality into school.

In addition to supplying scholarly materials, the authors have attempted to provide a structure that will permit achievement of the stated aims. This structure demands close integration of the materials with the written text, and requires carefully constructed exercises based on these materials. The exercises are organized around real problems presently facing people in various regions of Canada. Finally, conclusions must be drawn and generalizations made by the children themselves. Through consistent, related themes, particularly that of the conservation of resources, a sequential, developing story of the geography of Canada is evolved. The following suggestions to teachers using the text are, therefore, important:

1. As there are more exercises than the average class can complete during a year's work, a selective approach to the book is essential.

2. Since it is assumed that the home region and the home province will be treated thoroughly, this selective approach will especially apply to the study of other regions and provinces. It is hoped that from the problems and topics supplied for each province, the teacher will make his own selection of those best suited to the abilities and interests of his class. The last chapter should be left until the end, no matter in which order previous chapters are studied.

3. From the foregoing, it is assumed that the teacher will be encouraged to write his own syllabus. In doing so, the textbook may provide a useful framework or structure but should not be followed slavishly. It is best regarded as a source book or repository of materials. All generalized accounts of regions must be preceded by an abundance of accurate detail. Although the method already suggested should lead pupils to valid conclusions and generalizations, the authors do not presume to foresee the trend of investigation and discussion in any particular class. The teacher is best qualified to perceive and to direct this trend and to guide the pupils to sound geographic understanding. For this reason, conclusions suggested by the text are often tentative. The teacher should supplement the book in any way that he considers necessary.

4. It is not assumed that there is an absolutely right or wrong answer to every question posed in the text. Pupils must be encouraged to make inferences and to draw tentative conclusions from data. In this sense, good geography teaching is like good science teaching. In addition to separate exercises based on the materials, there are many questions in the body of the text that invite pupils to recall material already learned, to speculate about a problem or to look ahead. This procedure is adopted because geography should be an inquiring subject and the study of Canada should be an unfolding drama. Written answers to all exercises should not be expected. The classroom should be like a laboratory where reading, class discussion, investigation, and experiment, using the materials provided, will be typical activities. The organization of the text lends itself well to brief, specific outside assignments.

Believing this book to be a new approach to the teaching of geography in Canadian schools, the authors will appreciate comments and suggestions from teachers, especially those who use it in the intermediate and junior high school classrooms.

NVS
GST
DMT

Vancouver, B.C.
May 15, 1963.

Acknowledgments

This book could not have been written without the willing co-operation of geographers, government officials, and many other persons right across Canada. In all cases, sources of photographs, maps, special studies, and other materials used have been acknowledged in the text itself. Such acknowledgment may not always extend to particular persons in numerous agencies, both public and private, who gave freely of their time and special knowledge. To all such persons, the authors are duly grateful.

Special acknowledgment is due Mr. E. D. Baldock, Chief Cartographer of Canada, and Dr. N. L. Nicholson, Director of the Geographical Branch, Ottawa, who co-operated so graciously in making government maps and other materials available. Thanks is also due to Dr. D. B. Turner, Secretary of the British Columbia Natural Resources Conference, and to Mr. J. H. Blicq, of the Manitoba Department of Industry and Commerce, for making available certain materials relating to their respective provinces.

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Mr. Charles Goode drew the final versions of the maps, graphs, and diagrams. Mrs. G. Lilge and Mrs. F. Grayston gave splendid assistance in typing the manuscript.

Finally, we would like to thank the staff of W. J. Gage Limited, particularly Dr. W. R. Wees, Dr. M. O. Edwardh, and Mr. Frank English for their encouragement and advice.

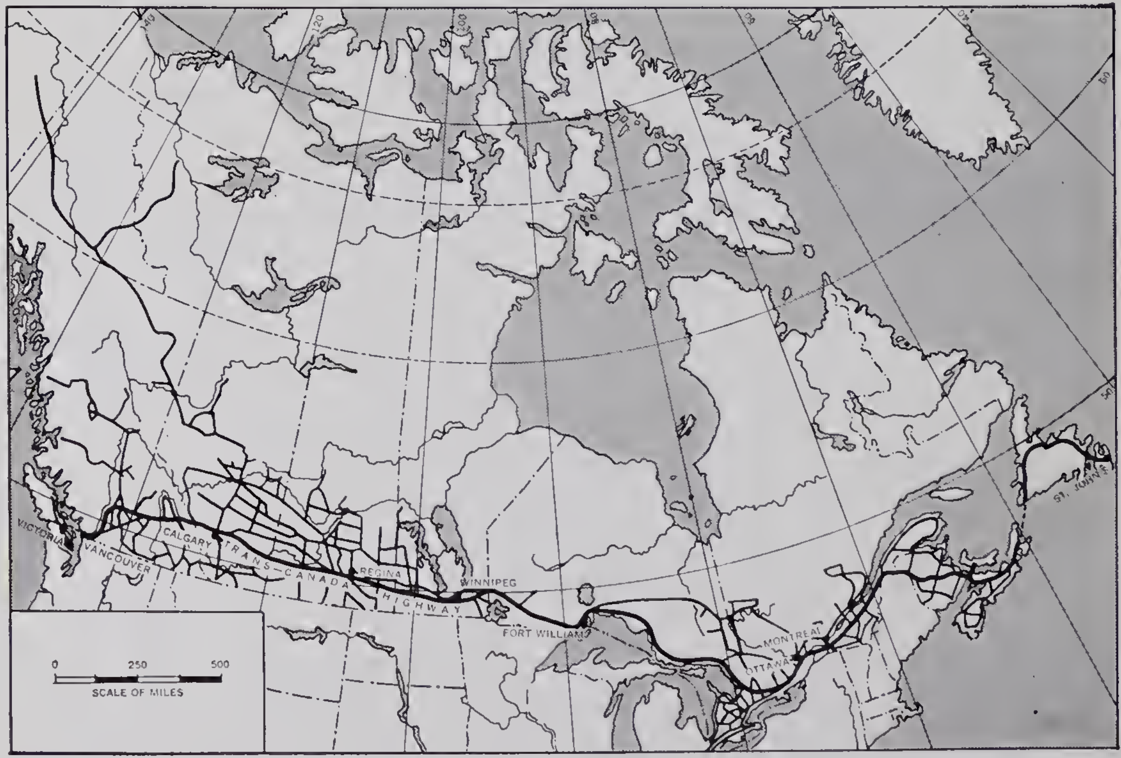
NVS
Vancouver, B.C. GST
May 15, 1963 DMT

A new geography of Canada

CHAPTER 1

Introducing Canada

In September, 1962, the Prime Minister of Canada officially opened the Trans-Canada Highway. This road, extending as shown in Figure 1-1, from St. John's, Newfoundland, to Victoria, British Columbia, is the longest continuous national highway in the world. It would take an average motorist at least ten days to drive the full length (more than 4000 miles) of this road. In doing so, he would drive through six time zones. When schools are completing their day in St. John's at 3:00 P.M., it is only 10:30 A.M. in Victoria. Figure 1-2 shows the Trans-Canada Highway near Rogers Pass, where it crosses the great mountains of British Columbia. Why was this the most difficult and costly section to build? Chapter 9 will give you further information about this part of the highway.



1—1 Canada's major roads are shown on this map. How does the Trans-Canada Highway stand out?

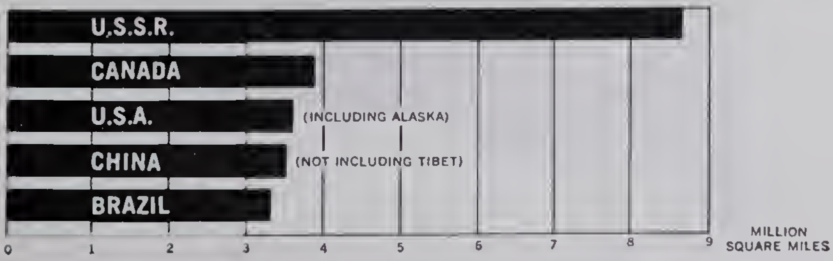
1—2 The Trans-Canada Highway at Rogers Pass in the Selkirk Mountains, British Columbia (British Columbia Government photo)

What do these facts suggest about the size of Canada? Even the straight course of a modern jet airliner requires a journey from St. John's to Victoria of 3200 miles. A man in Halifax, Nova Scotia, is closer to London, England, than he is to Vancouver.

The sizes of the five largest countries in the world are indicated on the bar graph in Figure 1-3. Which is the largest? How does Canada compare with it in size?

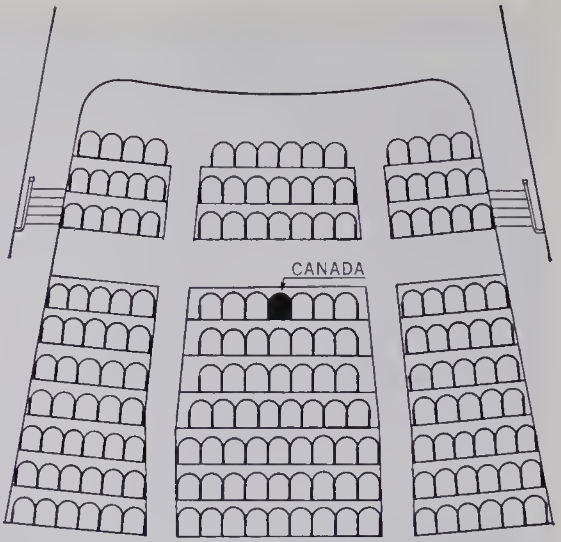
The enormous size of Canada brings both advantages and disadvantages. Our small population is blessed with millions of acres of farmland and forest. About half the fresh water in the world is located within Canada's borders. Immense quantities of minerals lie beneath the surface.

A family moving from St. John's to live in Victoria must spend more than $2000 to send its furniture by truck over the Trans-Canada Highway. Transportation is very costly because of the vast distances, the great swampy areas, and high mountain ranges, which must be crossed. A small population means that not enough tax money has been available to build roads and, often, there has been insufficient business to justify the cost of their construction. For many hundreds of miles, the Trans-Canada Highway carries less traffic than quiet residential streets in a Toronto suburb.



1—3 Comparing the sizes of the five largest countries in the world

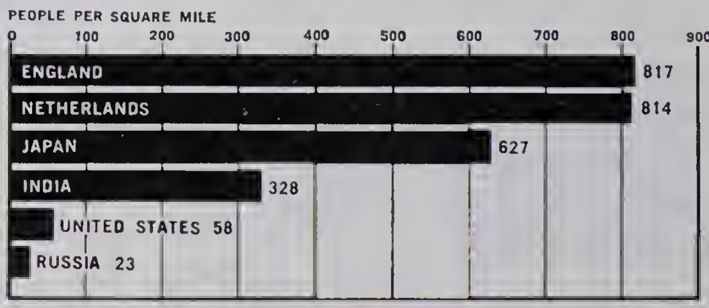
1—4 This auditorium of 180 seats represents the population of the world. How many seats can Canada claim?



In the 1961 census, the population of Canada exceeded 18,000,000 people for the first time. Yet this is less than one percent of the population of the world. If we can think of the world's 3.2 billion people represented, as in Figure 1-4, by an auditorium seating 180 people, Canada's population would entitle it to only *one* seat. The *density* of population of a country is a measure of how crowded it is. By dividing the area (3,845,774 square miles) of Canada into the population, we find that it has a population density of nearly five people to the square mile. Some other countries have much heavier population densities as shown in Figure 1-5.

How many times more crowded than Canada is Japan? How many times more crowded is England? The United States? Population densities are figures to be used with great care. We know that people are not evenly distributed throughout Canada in a ratio of five to every square mile. Hundreds, or even thousands, of people may live within a square mile in a densely populated city such as Montreal. On the other hand, vast areas of the Northwest Territories and Northern Quebec contain no people at all. Even in the more crowded areas of Southern Ontario there are no places where the rural population density approaches that of England, Japan, or the Netherlands. Japan is

1—5 Population densities of six selected countries

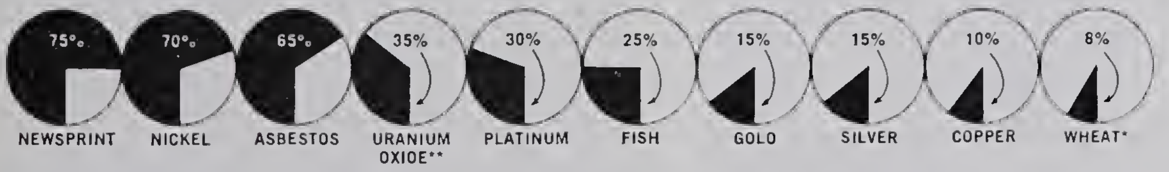


smaller than the province of Saskatchewan and has less than half as much good farmland as that province, yet, it has *five times* as many people as Canada. Locate New Brunswick in Figure 1-16. Note the size of this small province in relation to Canada as a whole. Yet the Nile Valley of Egypt, only *half* the size of New Brunswick, *contains more people than live in all Canada.*

There are about 150 acres of land for every Canadian. This compares with less than 1¼ acres of land for every inhabitant of Italy, England, and Japan. Of course, the number of acres per person (which is another way of expressing the population density) can be a very misleading figure. *Most* of the 150 acres of land supposedly available to every Canadian are not suitable for cultivation or other practical use. Name some kinds of land and some areas of Canada that are not suitable for cultivation or settlement. It is estimated that there are 25 acres of good or usable land for every Canadian. The figures for some other countries are:

India	1 acre
England	4/5 of an acre
Japan	7/10 of an acre

Canadians are thus very fortunate in comparison with other people. From our land, we are able to produce much more than we require. For example, in 1960, with less than 1 percent of the world's people, Canada produced:



1—6 Canada as producer of percentages of some world resources (See footnotes for remarks on wheat* and uranium oxide**.)

These resources and many others have helped to give Canada one of the highest *per capita**** incomes in the world. During the years 1957-59, the annual per capita income in Canada was estimated to be between $1500 and $1600. Comparable figures for other countries are as follows:

---

*This will not seem a high proportion to those who think of Canada as one of the world's greatest wheat producers. *Most* countries grow wheat and some, such as Russia and India, produce vast quantities which must be kept to feed their own people. Canada *is* a major grower of wheat, but, more important, is the world's greatest exporter of wheat, her exports often accounting for one quarter of the world's trade in that grain.

**This figure actually refers to production by the countries of the non-communist world.

***"per capita" comes from the Latin and really means "by the head." "Per capita income" means the average amount of income for every man, woman, and child in the country. It is arrived at by dividing the total population into the total income earned.

United States	$2100-2200
Sweden	1100-1200
United Kingdom	900-1000
Italy	400-500
Japan	200-300
Egypt	100-200
Brazil	100-200
India	Less than $100

The per capita income of a nation reflects what is often called "the standard of living." This refers to such things as how much food (and the quality of food) is available, the kinds of houses, clothes, roads, schools, and sanitation facilities. Few Canadians go hungry, most live in warm houses, most are healthy, and nearly all Canadian children have the privilege of schooling.

All these things are a result of our country's great wealth. Three quarters of the world's people are hungry, unhealthy, and many are illiterate. Our study of geography should emphasize our great responsibility for conserving our wealth. It should also teach us to understand other people's problems and to share some of our wealth with them. A Canadian schoolboy who has enjoyed a hearty morning breakfast has already had more to eat than many schoolboys in India can expect in a full day.

Canada is a huge country with a small population and tremendous resources. Its people live better than 90 percent of the world's population. Yet, its great size creates certain problems. Size, for example, helps to explain why there is no national daily newspaper as there is in most small European countries. At the same time, size has helped to make Canada a land of contrasts, with a great variety of scenery, climate, resources, and occupations. What contrasts in scenery are evident between Figures 1-7 and 1-8? What different ways of using the land are illustrated by Figures 1-9 and 1-10? What contrasting occupations are illustrated by Figures 1-11 and 1-12? Figures 1-13 and 1-14 show two Canadian settlements. What are the chief differences between life and work at Toronto and at Pond Inlet?

Climate is an important factor causing contrasts in Canada. While boys in Winnipeg are skating on outdoor rinks during their Christmas vacations, boys in Victoria are playing soccer. What contrast in winter climate does this suggest between the two places? In what ways is life at Winnipeg different in July from what it is in January?

1—7

1—8

1—9

1—10

1—11

1—12

1—13

1—14

Think of living conditions, work, recreation, and other activities in answering this question.

The severe winter climate in places like Winnipeg is another great problem faced by Canadians. Most successful farming requires a *frost-free season** of at least 100 days. Less than half of Canada has as many days free of frost. Large amounts of certain foods and raw materials must be purchased abroad, in warmer countries, because they cannot be grown in Canada. For example, since cotton requires at least 200 frost-free days, all the raw materials for the cotton mills of Quebec must be imported. List some imported foods and beverages used in your home. Name some foods, grown in Canada during the summer, that must be imported in winter.

Winter conditions greatly increase the cost of living. The city of Montreal, for example, spends 8,000,000 dollars a year for snow removal. This expense is a great burden to the taxpayers. List some ways in which winter living for a family in Montreal would be much more expensive than in a warm place such as Phoenix, Arizona. Important Canadian ports such as Quebec must close for at least four months in winter.

Location is another problem. Canada is located in the northern part of the Northern Hemisphere, which stretches from the equator to the North Pole. On a globe, trace the line that represents 45 degrees north latitude. Note that most of Canada is located north of this line. How far north does the country extend? This northerly location helps to account for the short growing season and severe winters. Canada is placed between the two great world powers, the United States and Russia. On a globe, locate the North Pole and the Arctic Ocean. Note that Canada and Russia are close neighbors, so close that no one is sure which country owns some very small islands in the Arctic Ocean.

Canada's location between the two great world powers gives her a special interest in helping to preserve peace. With her small population and limited military power, Canada cannot hope to defend herself. Her interest lies in trying to persuade others to avoid warlike behavior. For this reason, Canadian soldiers have been serving on the Israeli-Egyptian border, in the Congo, in Viet Nam, and other places where peace is threatened. Canada's great resources are the envy of other nations. Managing these resources well and trying to use them for the benefit of all mankind is wise as well as charitable. This is why

---

*The frost-free season refers to the number of days between the last frost in spring and the first frost in fall. The dates of frosts are averaged over the years for which records have been kept at each place. At Edmonton, for example, May 29 is the average date of the last frost in spring. In any particular year, the last frost could occur much earlier or much later than May 29.

Canada has made gifts of food to poor nations, and why Canadians have gone overseas to teach people better ways of farming, fishing, mining, and so on.

Helping other nations to grow richer and stronger benefits Canada in other ways. Because we produce far more goods than we can use, we are a great trading nation. At present, Japan is buying nearly all the iron ore mined in British Columbia. This provides thousands of jobs for the people of that province. Prairie farmers depend on selling their wheat abroad. In total trade, Canada is, despite her small population, one of the five or six leading nations of the world. Our customers, such as Japan, must be able to afford to buy our iron ore and our wheat. If, with our encouragement, they grow richer, our trade with them is bound to expand.

Canada's small population has been mentioned several times. It is important to know not only how many people a nation has but, also, where they live or, as geographers say, *how they are distributed.* Figure 1-15 is one of the most important maps in this book. On this map, each dot stands for 1000 people. What do the large dots and circles stand for?

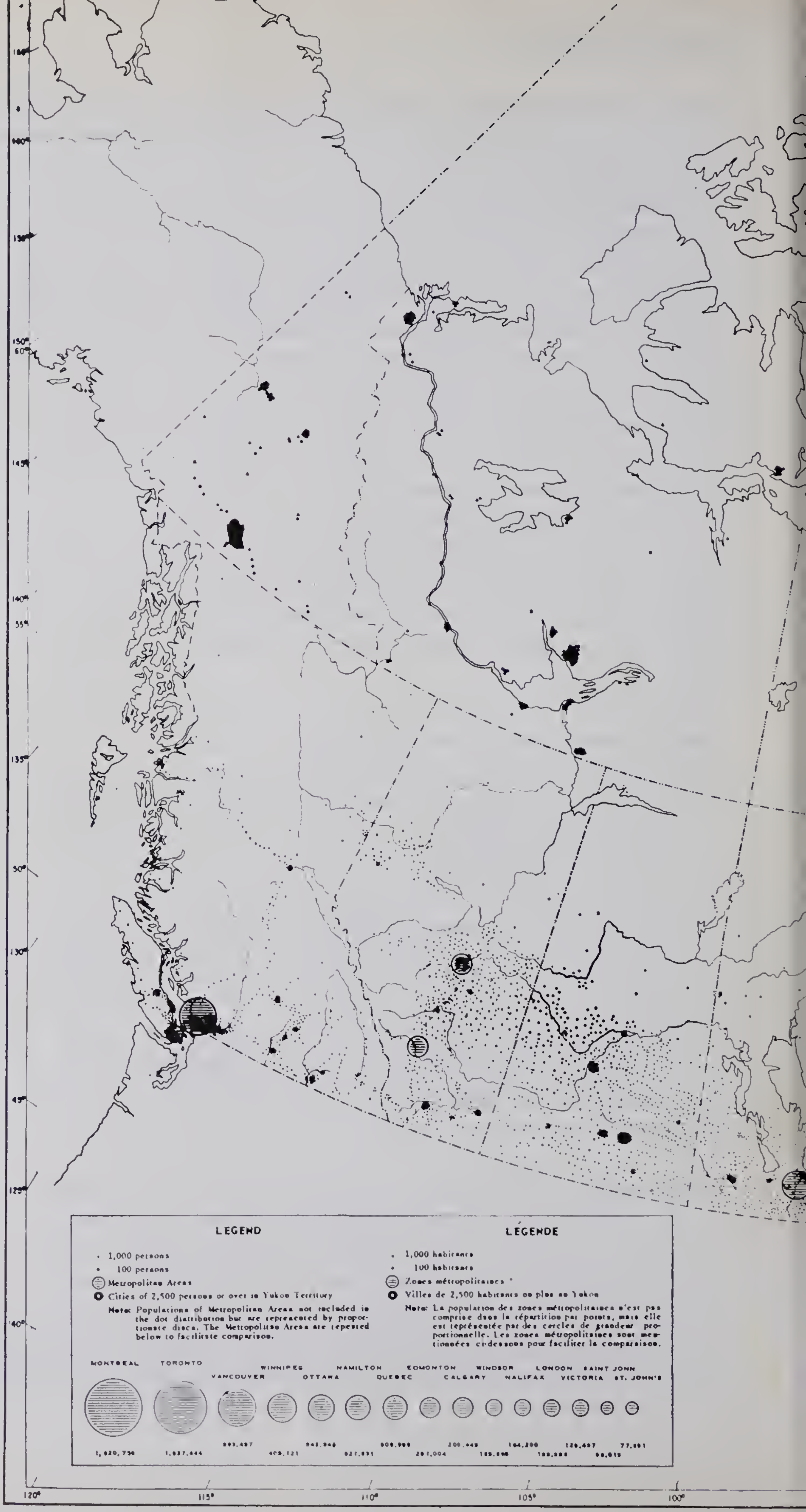
How is Canada's population distributed?

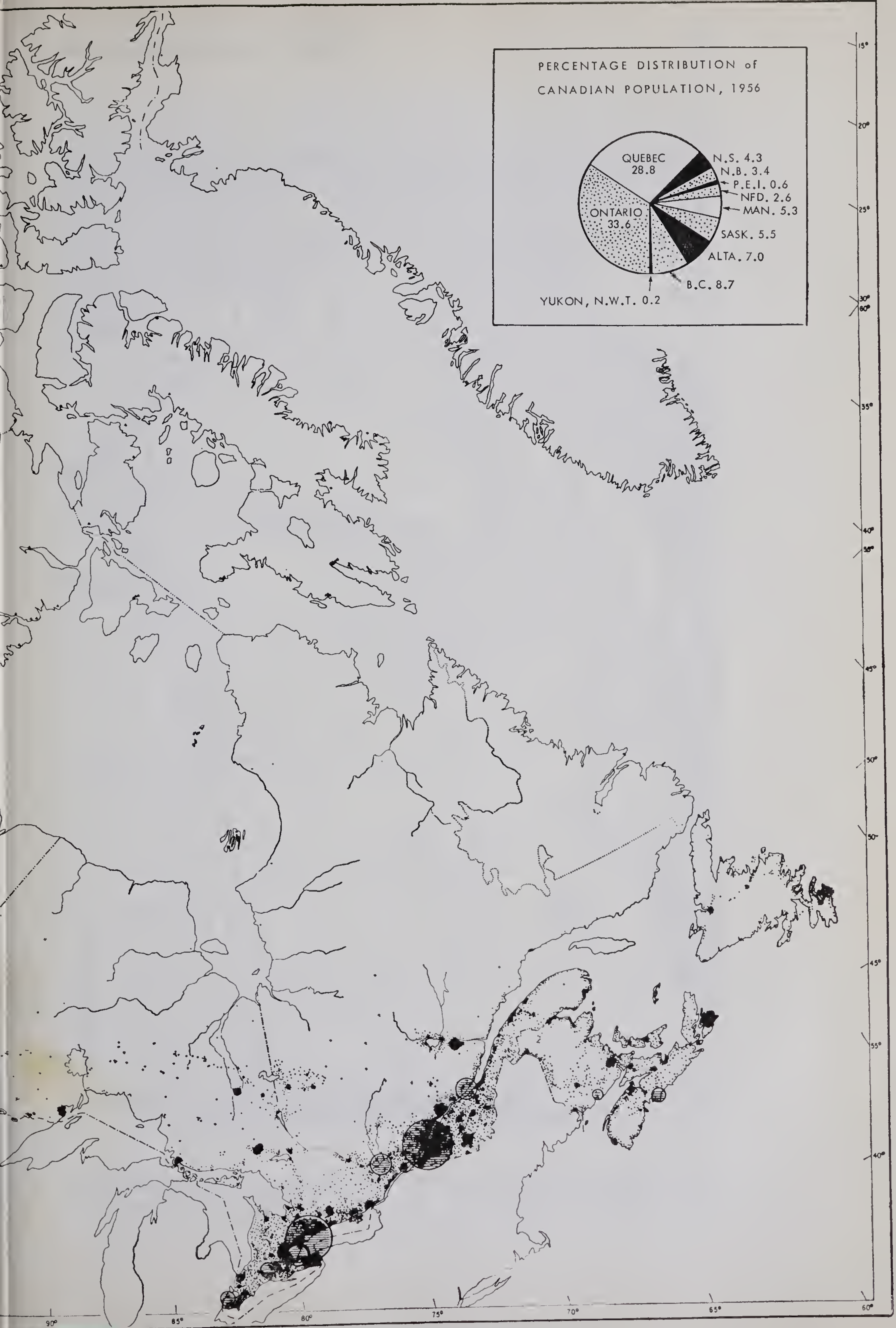
1. How could you describe the population distribution over most of Canada?
2. (a) Compare the population of Northern Canada (north of Latitude 52°) with that of Southern Canada.
   (b) Make a statement about the distribution of Canada's population in relation to the United States border.
   (c) In which parts of which provinces do most Canadians live? Together, these parts comprise the greatest concentration of population in the country. Name three other areas of the country that contain large numbers of people.
3. (a) Describe the distribution of population in the four Atlantic Provinces.
   (b) Describe the distribution of population in Southern Quebec and Southern Ontario in relation to major rivers and lakes.
   (c) How does the populated region of the Prairie Provinces compare in size and distribution with the other three major concentrations?
   (d) What are the most notable features of the population distribution of British Columbia?

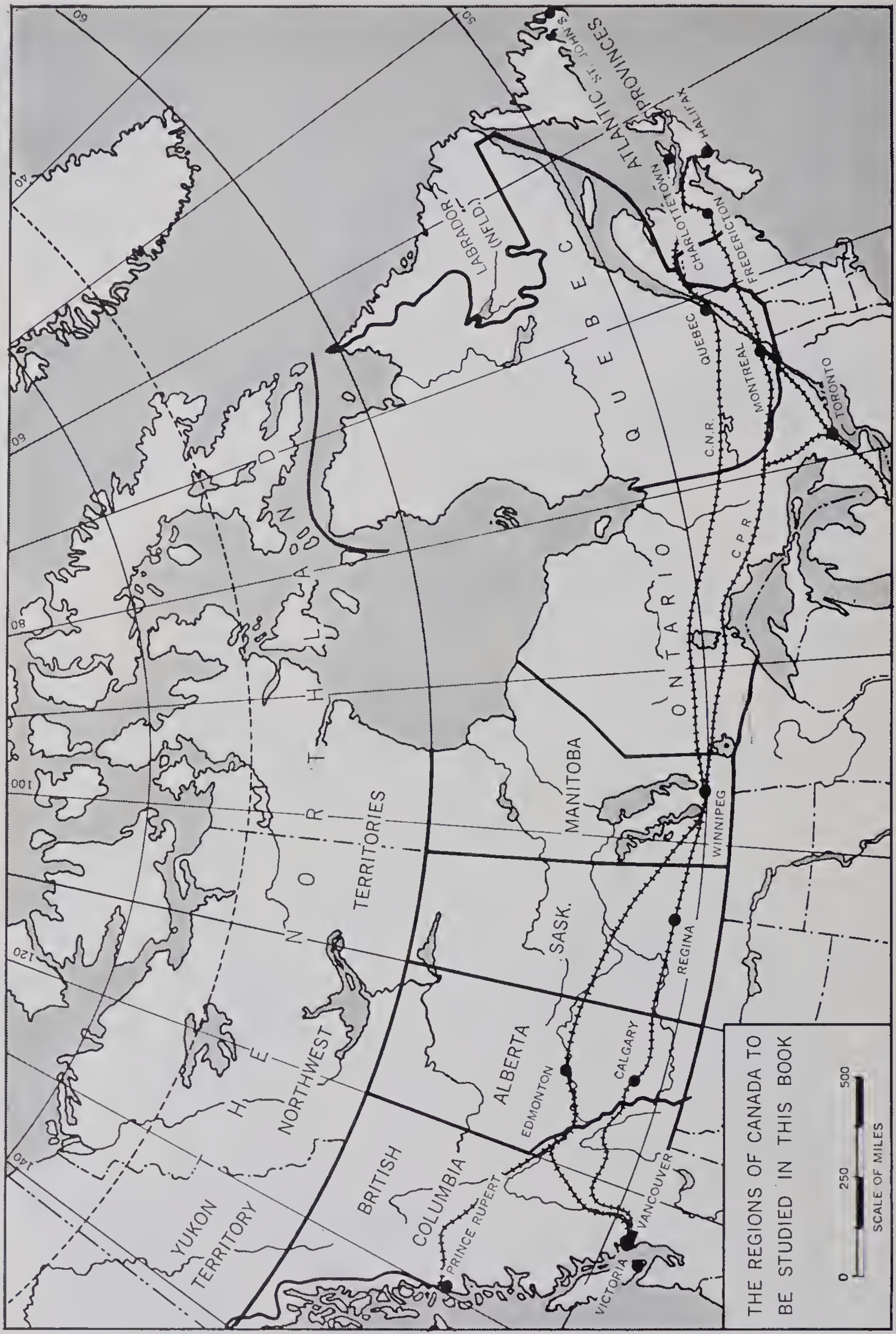
The study of the population map raises one of the major questions in the geography of Canada: *Why do Canadians live where they do?*

In seeking to answer this question and others related to the problems of Canada's size, location, severe climate, and resources, it is necessary to divide the country into regions. Figure 1-16 shows the provinces and territories that will serve as the basis for dividing Canada in this way. Figure 7-1 on page 297 shows how Saskatchewan

1—15 The distribution of population in Canada in 1956 (from the Dominion Bureau of Statistics)


LEGEND
· 1,000 persons
• 100 persons
Metropolitan Areas
Cities of 2,500 persons or over in Yukon Territory
Note: Populations of Metropolitan Areas not included in the dot distribution but are represented by proportionate discs. The Metropolitan Areas are repeated below to facilitate comparison.
LÉGENDE
· 1,000 habitants
• 100 habitants
Zones métropolitaines
Villes de 2,500 habitants ou plus au Yukon
Note: La population des zones métropolitaines n'est pas comprise dans la répartition par points, mais elle est représentée par des cercles de grandeur proportionnelle. Les zones métropolitaines sont mentionnées ci-dessous pour faciliter la comparaison.
MONTREAL
TORONTO
VANCOUVER
WINNIPEG
OTTAWA
HAMILTON
QUEBEC
EDMONTON
CALGARY
WINDSOR
HALIFAX
LONDON
VICTORIA
SAINT JOHN
ST. JOHN'S
120°
115°
110°
105°
100°


PERCENTAGE DISTRIBUTION of CANADIAN POPULATION, 1956
QUEBEC 28.8
ONTARIO 33.6
N.S. 4.3
N.B. 3.4
P.E.I. 0.6
NFD. 2.6
MAN. 5.3
SASK. 5.5
ALTA. 7.0
B.C. 8.7
YUKON, N.W.T. 0.2
15°
20°
25°
30°
60°
35°
40°
35°
45°
50°
50°
45°
55°
40°
90°
85°
80°
75°
70°
65°
60°



1—16 The provinces and territories as divisions of Canada used in studying this book has been divided into several small regions. In studying each small region, we should ask: What is it like there? How does it feel to live and work there? Why is life in Banff different from life in Moose Jaw? Why does Northern Ontario have many pulp and paper mills and hydro-electric power stations, while Prince Edward Island has none of these? Answers to all these questions can usually be found by studying the relationship between man and his natural environment.

Explaining this relationship is another great purpose of studying geography.

The best way to study places is to visit them and to make careful observations. A visit to a tobacco farm in Southern Ontario will give us a more vivid idea about tobacco growing than any reading about it. Unfortunately, we can visit a few places only, but, by studying good photographs, maps, careful descriptions, and other materials we can understand what various parts of Canada look like and what it feels like to live and work in them.

THE STUDY OF LOCAL GEOGRAPHY

Every student can study his home district firsthand. Whether he lives in a busy manufacturing city like Toronto, or on a lonely ranch in British Columbia, every student should learn about his own neighborhood. The best way to begin is to go out with a notebook and a map to record by sketches, diagrams, maps, and words what is to be seen. Walk down any road or street and record in a notebook all the details about the trees and flowers, houses and stores, workshops and factories that you may not have noticed before. Consider whether or not there is any pattern or interesting conclusion that you can draw about their distribution. Afterwards try to explain the facts observed.* For example, you may have noticed that most of the buildings are made of brick, stone, or wood. Which is the most common material used in your district and why is this particular one used? Are most of the buildings in the city as a whole made of the same material? Why are other materials used in other cities?

Maps — especially *large-scale maps* — are important. The town-planning office or some other department in your city hall may be able to supply such a map. The local *topographic* map can be obtained by writing to the Map Distribution Office of the Department of Mines

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*This discussion, and some of the material used is based in part on Chapter 3 of *Britain and Overseas,* by R. C. Honeybone and M. G. Goss. It is reproduced here by kind permission of the authors and their publishers William Heinemann Limited.

and Technical Surveys in Ottawa. If you name your town or note the latitude and longitude of the place where you live, this map will be supplied at a cost of only 50 cents. As you walk around your neighborhood, you can find things on the ground that are not marked on the map. These can be placed on the map, using appropriate symbols. Figure 2-13 is part of a large-scale topographic map issued by the Federal Government. Figure 2-23 shows part of another map in full color. The exercises on page 37 will show you how to read such a map. The legend of all such maps in this book are found on the inside front cover.

Using your local map, go to the top of a hill or a tall building and examine the appearance of the land. Notice where the hills and valleys, if any, are located and trace the courses of rivers. Observe where the farms or factories are situated. Is there any particular pattern to the distribution? In every case, the map helps identify things in the landscape. Figure 2-23 should be compared with Figure 2-25. Which features in the photograph can be identified from the topographic map?

As a part of your local study, simple maps of your home or school neighborhood can be drawn.* Make maps to show your route to school, the route from your home to the centre of town, and so on. On each map:

(a) Include symbols marking places of interest or importance. As far as possible, use the symbols shown in the legends in this book. These symbols are the standard ones used on all maps of the government's National Topographic Series. Always include a legend on any map you draw.

(b) Add an arrow to show the north point. It is not necessary to have this always pointing to the top of the page.

(c) Include a scale. Various ways of representing scales are described on page 26.

A useful and interesting exercise that can be carried out near almost any school is a classification of the buildings. For example, indicate on a map the age of the buildings in a block near your school. Those built before 1900 could be recorded in black shading; those built between 1900 and 1950 could be indicated by dotted shading; those built since 1950 could be shown by means of horizontal lines. Such an exercise will tell you much about the historical development of your neighborhood. Similarly, a map could be drawn to show the present use of buildings, with a key to indicate commercial use (shops and

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*Excellent suggestions for local mapwork will be found in *Understanding Maps,* by F. C. Hardwick and C. Midgeley, published by Clarke, Irwin Ltd., Toronto.

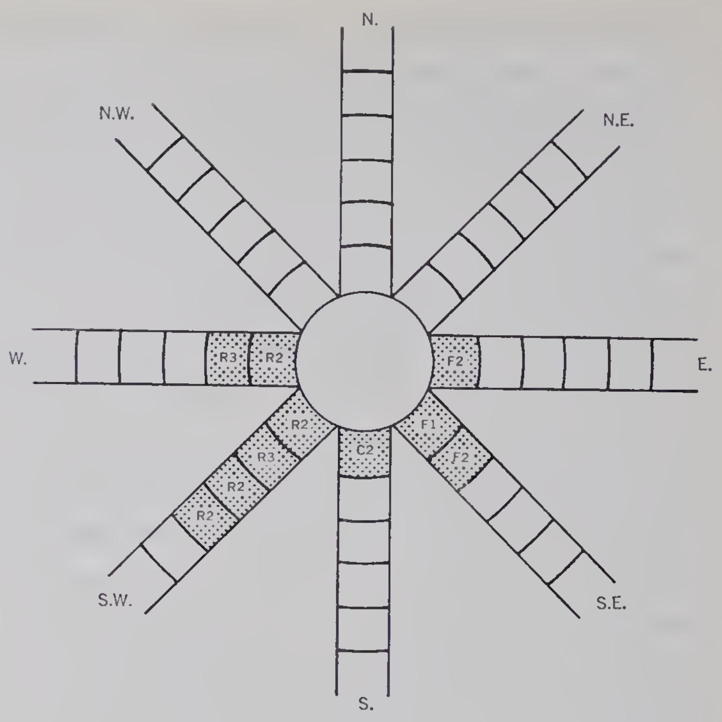
offices), industrial use (factories), institutional use (schools and churches), and residential use (houses).

An interesting map, available free from any service station, is the road map of your province. This usually contains detailed, fairly large-scale maps of important towns and cities. Sometimes, a very detailed street map of a large city such as Montreal, Toronto, or Vancouver is available separately.

Weather observations are an important part of your study of local geography. These include observations of the temperature, rainfall, wind strength, and direction. It is important to understand how such observations are made and to appreciate what a temperature of, for example, –30°F. or 90°F. feels like and to have some idea of what one inch of rainfall means. Accurate measurements of temperature and rainfall can be made only with such instruments as a thermometer or rain gauge, which may be available in your school. A visit to your local weather station will be useful. Observations of the wind speed and direction are easily made. You may pass a weather vane on the way to school in the morning. If not, you can judge the direction from the movement of smoke or trees or low clouds. The wind speed can be estimated by using the simple scale (1) light, (2) moderate, and (3) strong.

Newspaper reports and radio broadcasts are good sources of information about the weather. From your own observations and from these sources, good weather records and charts can be kept in the classroom. Make a chart showing minimum, maximum, and average temperatures each day for a month. How the average temperature is determined has been explained at the bottom of page 32. On this page is a climatic graph of St. Catharines, Ontario. You can learn much about the climate of that city by doing the exercise that accompanies this graph. Obtain climatic data for your own neighborhood and draw a similar graph. Compare it with the graph for St. Catharines. As you keep local weather records for a month, it may be helpful to keep similar records for some other Canadian city. The data is published in most daily newspapers. Keep a record for a place that has a very different climate from your own. For example, if you live in Edmonton, keep a record of conditions at Vancouver.

A *wind rose*, shown in Figure 1-17, is a type of chart very useful in keeping weather records. Each day, shade in light pencil a rectangle in the arm that indicates the direction *from* which the wind was blowing that day. In red pencil, mark some details about the weather, such as: R—rainy, C—cloudy or partly cloudy, F—fair or fine. In Figure



1—17 A wind rose is used for recording weather conditions as well as wind direction and strength.

1-17, the number beside each letter indicates the strength of the wind. Of the ten days shown, how many had winds from the west or southwest? How many days had rain? On how many days did strong winds occur?

Observations of the apparent movement of the sun are also interesting. We say "apparent" movement because the earth and sun are moving in a fixed relation to each other in space. As the earth turns from west to east, it appears to us that the sun is moving from east to west across the sky. A simple observation of the sun's position may be made each week. Mount a light stick (about two feet long) upright on a large sheet of heavy cardboard. Indicate a north point on the cardboard. At lunch time or near noon once each week, place the cardboard on the same spot in the school playground, with the north point always in the correct position. The sun, which is always in the southern sky at noon, will cause the stick to cast a shadow on the cardboard. Record the length and direction of this shadow by tracing a red pencil line on the cardboard. Be sure to record the date of each observation. Notice how the shadows change direction and length during the year. Compare your observations for different months, especially for December and June.

Examples of rocks and soils can be collected from your local area. The various types of rocks are described on pages 108-109. Which of these types is found in your neighborhood? What use, if any, is made of the local rocks? A study of a nearby lake or stream will yield much valuable geographical information. Are the trees and plants native to the area or were they introduced by man? In studying communications, note roads, paths, railways, airports, and ferries. Besides a study of buildings, as already described, other forms of *land use** should be noted. This may include farms, parks, playgrounds, and the like. Is the land use in your area well planned? Are schools and homes carefully located away from factories and busy highways? Is there sufficient parkland and recreation space? Is traffic congestion a serious problem? Investigation of all these questions and many more will lead to a fuller understanding of your home region.

Your study of the local area will help you to use the tools of the geographer. As you develop geographic skills, you will find it easier to answer the important questions posed by this book. These include the following:

1. How is her great size both an advantage and a handicap to Canada?
2. How is the population of Canada distributed—and how does this distribution and the small population create problems?
3. What resources have Canadians inherited and how do these resources contribute to our wealth?
4. What problems of conserving our resources are faced by Canadians?
5. How does Canada's climate present a problem?
6. In what ways is Canada dependent on other nations for her survival and prosperity?
7. What good reasons for studying the geography of Canada have been presented in this chapter?

To answer such questions as "Why is Canada such a fascinating land?" or "Why do our people live the way they do?" or "What kind of future does Canada have?" it will be necessary to wait until this book has unfolded the interesting drama of Canadian life from coast to coast. What may seem an intricate and confused conglomeration of people and places has in fact an understandable and sensible pattern. There is a very wonderful connection between the land and things people do for a living, and the kind of place in which they live. A knowledge of the climate and the landscape reveals a fascinating pattern which helps to explain why people live where they do. Let us become geographers and, thus, better Canadians in this exploration of our country.

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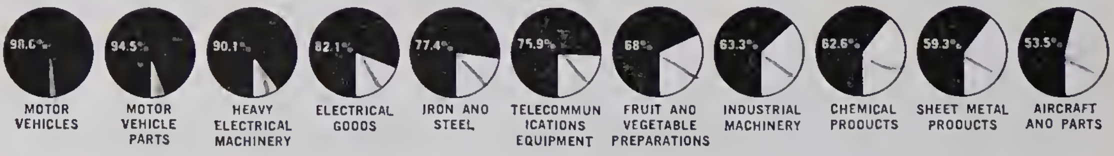
*This term refers to the use man makes of the land, but is also used to describe the surface cover of land in its natural state. Thus, the "land use" of a wild area covered by evergreen trees will be called "coniferous forest."

CHAPTER 2

Southern Ontario: Industrial Heartland

According to the 1961 census, more than 6,000,000 people live in the province of Ontario. They comprise about one third of Canada's population and outnumber the combined populations of the four western provinces. Most of these six millions live in Southern Ontario, a very small region that contains less than one percent of the area of Canada. This region is thus the most densely populated part of the nation. There are 367 factories in Canada that employ more than 500 persons each. Of these, 175 factories, or nearly half the total number, are located in Ontario.



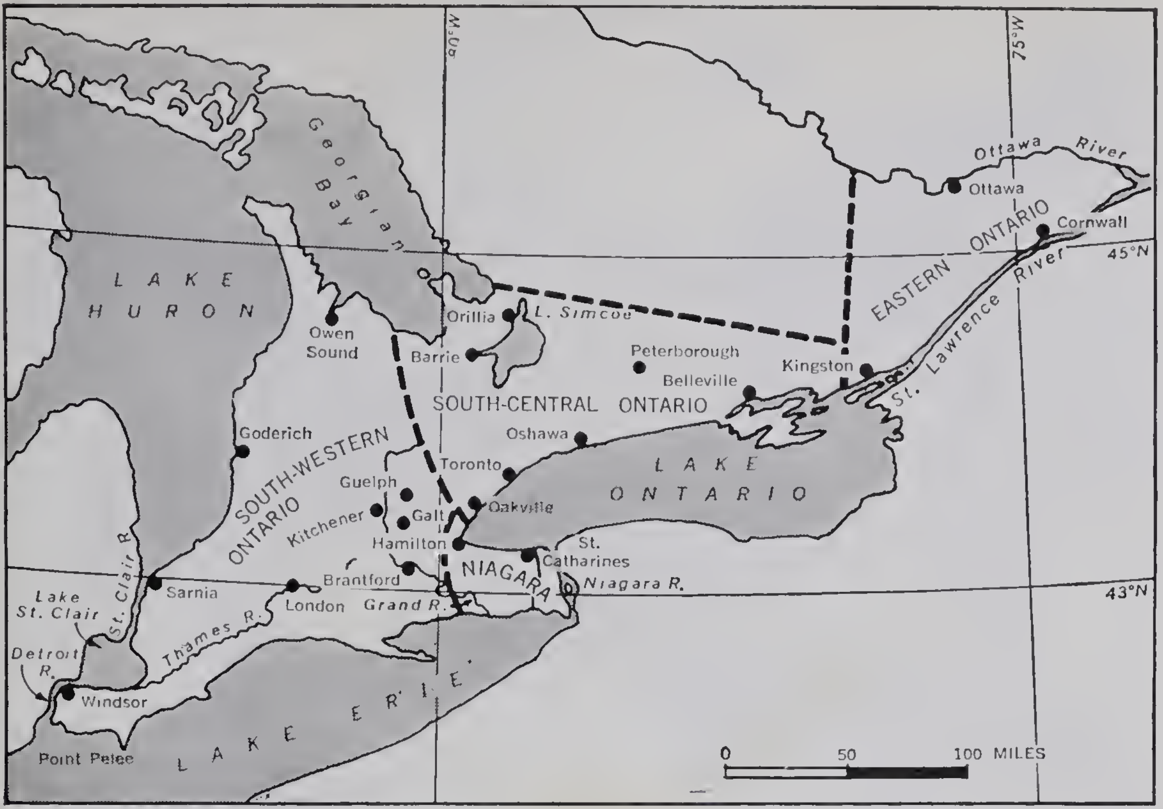
2—1 Ontario's production of certain articles as percentages of Canada's output

The province also produces nearly half of Canada's output of many other products, including furniture, books, and refined metals.

Although Southern Ontario is a small region and contains many towns and cities, it also contains more farms than any province of Canada. Cash income from these farms is, in most years, greater than that of any province. Thus, the region is not only the industrial heartland of Canada, as the above figures show, but is also a major agricultural region. These facts suggest the following major questions for consideration in this chapter:

1. Why does Southern Ontario contain more people than any other Canadian region? Why have so many large and important towns and cities developed there?
2. Why does it make half of Canada's manufactured goods?
3. Why is it one of Canada's greatest agricultural regions?

To answer these questions, it will be helpful to divide Southern Ontario into several smaller regions. These regions, and their major



2—2 The regions of Southern Ontario

towns and cities, have been shown in Figure 2-2. Refer also to Figure 2-3 which shows the counties of Southern Ontario. The whole region is often called the Lake Peninsula, although Eastern Ontario occupies the valleys of the Ottawa and St. Lawrence rivers and is really a westward extension of the lowlands of Quebec.

What is the location and position of Southern Ontario?

Figures 2—2, 2—3, and good atlas or wall maps of Canada and North America will be useful in solving the following problems:

1. (a) Which Great Lakes bound the Lake Peninsula on three sides?

(b) Name all of the cities shown in Figure 2—2 that are located on these lakes or on the rivers and canals that connect them.

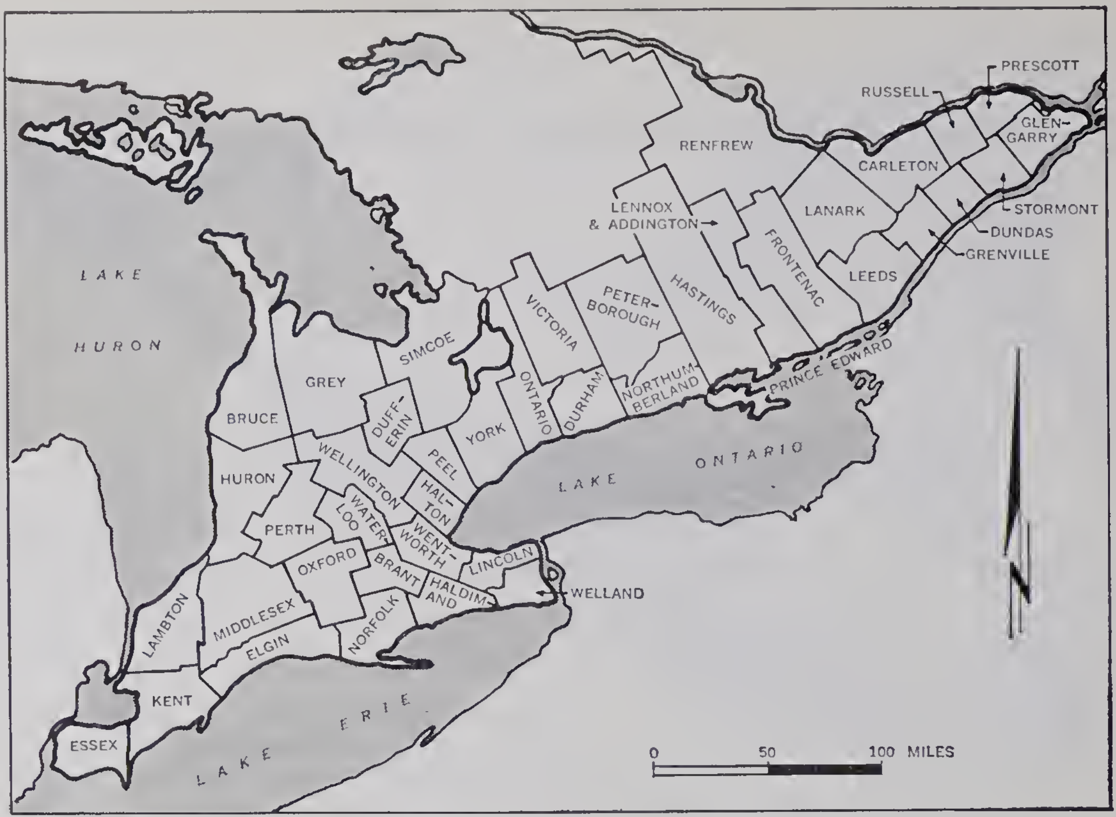
(c) Name the chief Ontario cities that are located on the St. Lawrence and Ottawa rivers.

2. A population map (such as that on page 10) shows that most of the people of Southern Ontario live along, or very near to, the shores of the lakes and rivers that you have named. No other Canadians live so far south.

(a) Refer again to Figure 2—2 and note the latitudes of Toronto, Hamilton, London, and Windsor. Compare the latitudes of these cities with the latitudes of Montreal, Winnipeg, Edmonton, and Vancouver.

(b) One degree of latitude equals about 70 miles on the earth's surface. How many miles farther from the North Pole is Toronto than Vancouver? Hamilton than Winnipeg? Windsor than Edmonton?

(c) Point Pelee in Lake Erie is the most southerly point on the mainland of Canada. What is its latitude? Is it closer to the Equator or to the North Pole?



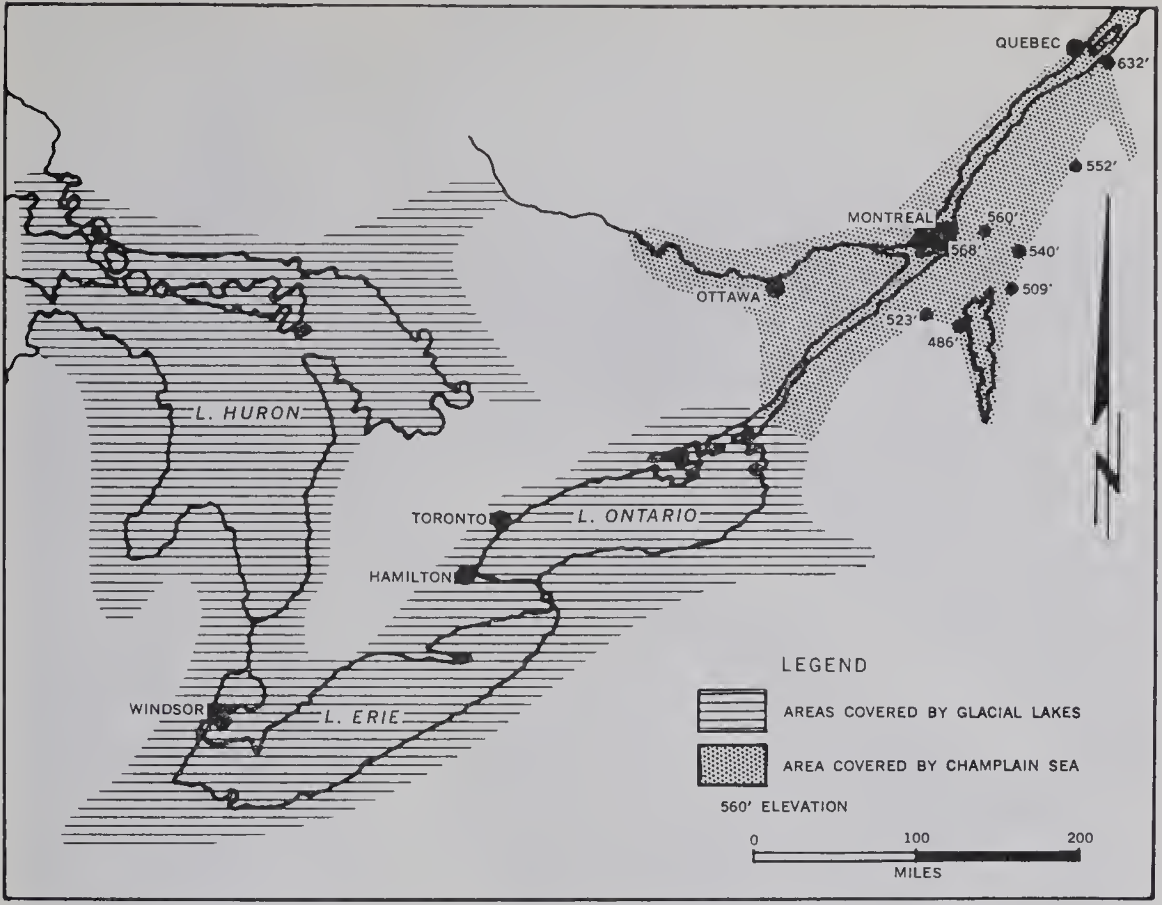
2—3 The counties of Southern Ontario

(d) Name some important cities of the United States that are located north of Windsor.

The Great Lakes-St. Lawrence Waterway is so important to the geography of Southern Ontario that a brief study of it is necessary before considering the separate regions shown in Figure 2-2. This study will show how it links up these regions and acts as an artery of trade and commerce and as a source of hydro-electric power.

Scientists believe that the Great Lakes were once much larger than they are today. In Figure 2-4, the shaded areas represent the extent of glacial lakes that existed thousands of years ago during the Ice Age. Ice, several hundred feet thick, covered the whole of Southern Ontario, and its great weight depressed the land. When the ice melted, vast quantities of water remained, flooding the areas shown in Figure 2-4. The ice itself and the later glacial lakes deposited much material such as the clay and sand that form large plains with good soils, used for farming in many parts of Southern Ontario today.

The ice helped to deepen the Great Lakes. Lake Superior, the largest body of fresh water in the world, is also one of the deepest, having a maximum depth of 1302 feet. With the exception of a small part of Lake Erie, all of the Great Lakes are navigable by large vessels.



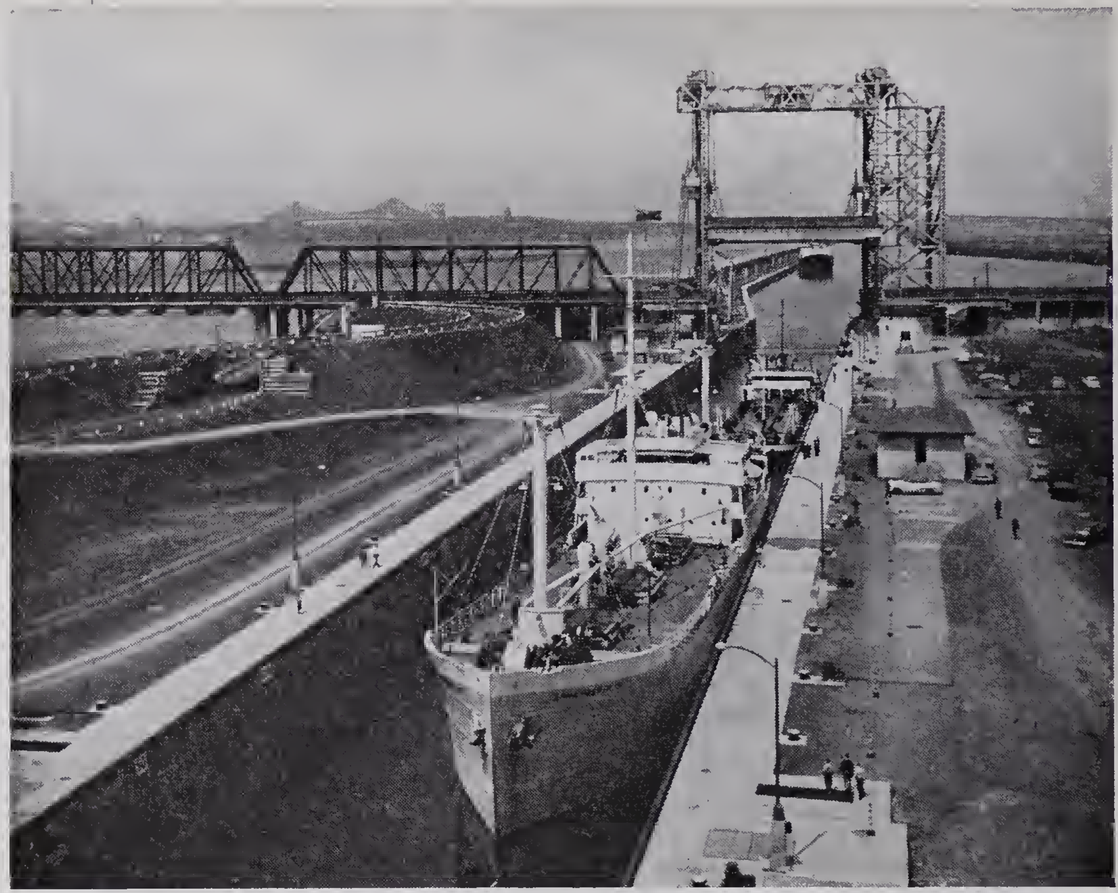
2—4 Glacial lakes and marine overlap in the Great Lakes-St. Lawrence Lowlands

Their water surface of 95,000 square miles is nearly twice the combined area of the three Maritime Provinces.

The early French explorers who tried to reach the Great Lakes by way of the St. Lawrence River found their way barred by many falls and rapids. A stretch of rapids that existed west of Cornwall at Long Sault disappeared in 1959 when the opening of the Seaway raised the level of the St. Lawrence River. The small canal, only 14 feet deep, disappeared at the same time, to be replaced by a modern 27-foot channel. The rapids were part of a series called the International Rapids, because this part of the St. Lawrence River is shared by Canada and the United States.

In 1781 the first canal on the Great Lakes-St. Lawrence Waterway was opened near Coteau-du-Lac in Quebec. The single lock on this canal was only two and one half feet deep. Compare this lock with the great 27-foot St. Lambert lock at Montreal, shown in Figure 2-5.

In 1825 the first Lachine Canal, only five feet deep, was opened. Soon, the first Welland Canal was opened. By 1855 a nine-foot channel existed all the way from Montreal to Lake Superior. By 1900 a 14-foot channel had been built. Above Lake Ontario, the minimum depth was 20 feet. When the Welland Canal was deepened to 25 feet in 1932,



2—5 The 27-foot St. Lambert lock at Montreal, the first step upward in the Seaway "staircase" (N.F.B. photo)

only the canals of the International Rapids remained a serious obstacle to navigation. In 1954, construction of the St. Lawrence Seaway began in order to overcome this obstacle and to provide cheap electric power to the industries of Southern Ontario.

Figure 2-6 shows a profile of the Great Lakes-St. Lawrence Waterway. Figure 2-67 at the end of this chapter or a good atlas map should be used in conjunction with the profile.

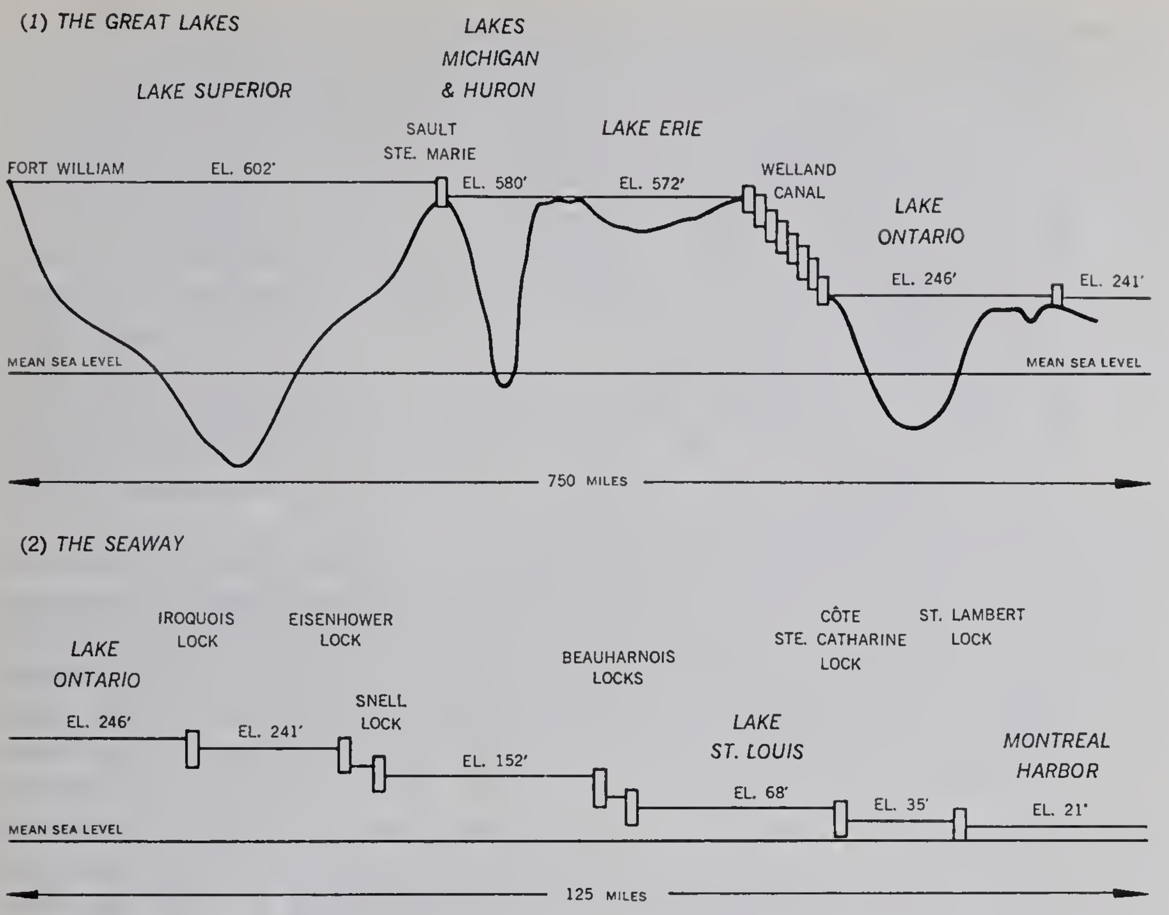
How does the Great Lakes-St. Lawrence Waterway unify Southern Ontario?

1. (a) When a giant grain carrier or "laker" leaves Montreal to pick up another load of wheat at Fort William, how many feet above sea level is it at Montreal Harbor?

(b) Study Figure 2—5 again. As vessels pass through the St. Lambert Lock, they are at the beginning of the Seaway, taking the first step up a series of locks to the Great Lakes. How many steps do they take between Montreal and Lake St. Louis?

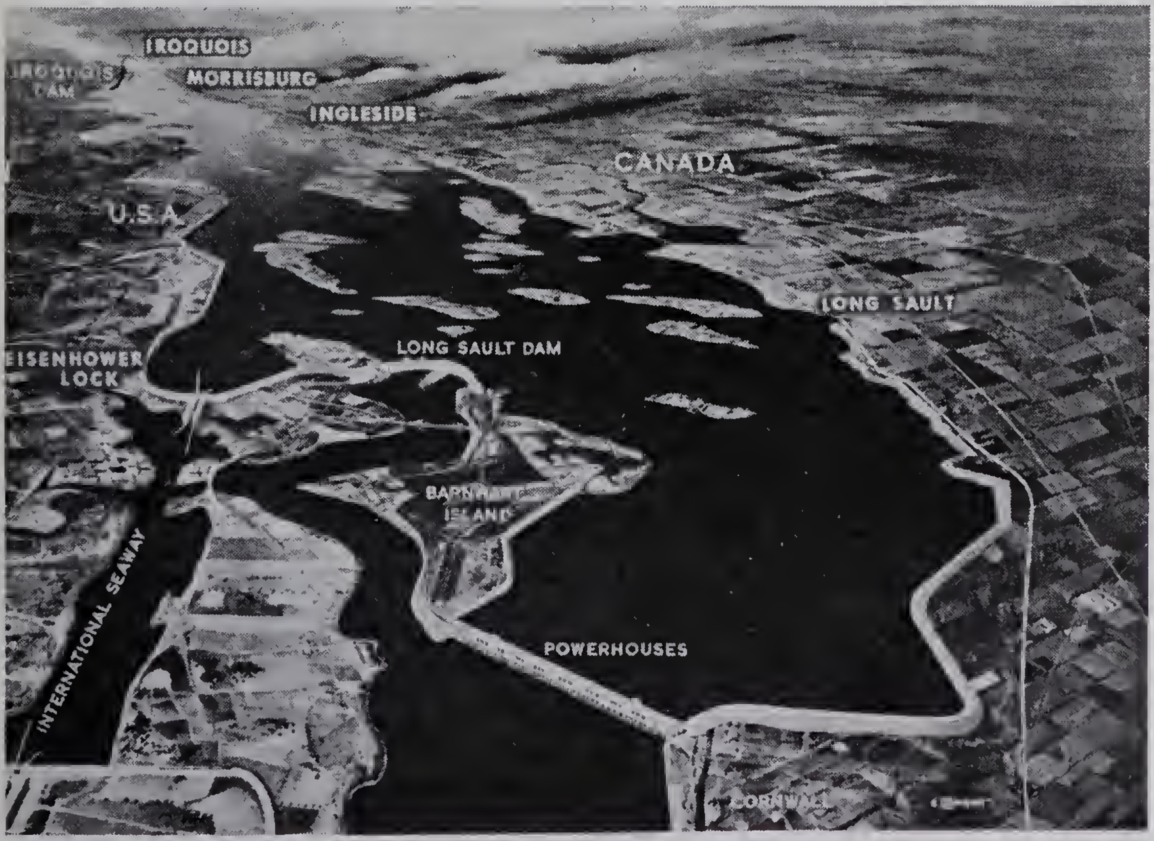
(c) West of Montreal, the "laker" takes two more steps up at Beauharnois. Study Figure 4—21 in Chapter 4; it shows the great navigation and power development there. Some Beauharnois power is sold in Ontario.

2. (a) When a ship reaches Snell Lock, how many feet has it been raised since leaving Montreal Harbor?



2—6 East-West profile of the Great Lakes and the St. Lawrence Seaway

2—7 An artist's view of the international section of the St. Lawrence Seaway (Ontario Hydro-Electric Power Commission photo)



(b) Through how many locks must a ship pass between Snell Lock and Lake Ontario?

3. Figure 2—7 shows an artist's conception of the main part of the international section of the Seaway, near Cornwall. Compare it with the profile in Figure 2—6.

(a) Locate Iroquois Dam and Long Sault Dam in Figure 2—7. The water between them forms Lake St. Lawrence, an artificial lake nearly 30 miles long.

(b) The rapids at Long Sault, several old canals, much farmland, and parts or all of several towns were flooded when Lake St. Lawrence was formed. Locate Long Sault in Figure 2—7. This is a new town in eastern Ontario. Some of Morrisburg was also flooded.*

(c) Locate the powerhouses shown in Figure 2—7. One belongs to Ontario and the other to New York State. Together, they form one of the largest hydro-electric installations in the world. The international boundary passes through the great structure shown in the picture.

(d) On which side of the boundary is the navigation channel located? Provision has been made for the construction of more locks near Cornwall if necessary.

4. After leaving the international section of the Seaway, vessels pass through the Thousand Islands. This is where the ancient, hard rocks of the Canadian Shield extend southward across the St. Lawrence River. Water and ice have been able to wear these rocks away only very slowly. As a result, they stand as islands where the river crosses them. Although called the Thousand Islands, there are nearly 2000 of them. Study Figure 2—8 which shows part of this beautiful, world-famous region of the St. Lawrence. The photograph was taken on the United States side, looking towards Ontario. In which state was the photographer standing? How do the Thousand Islands enrich this part of Ontario?

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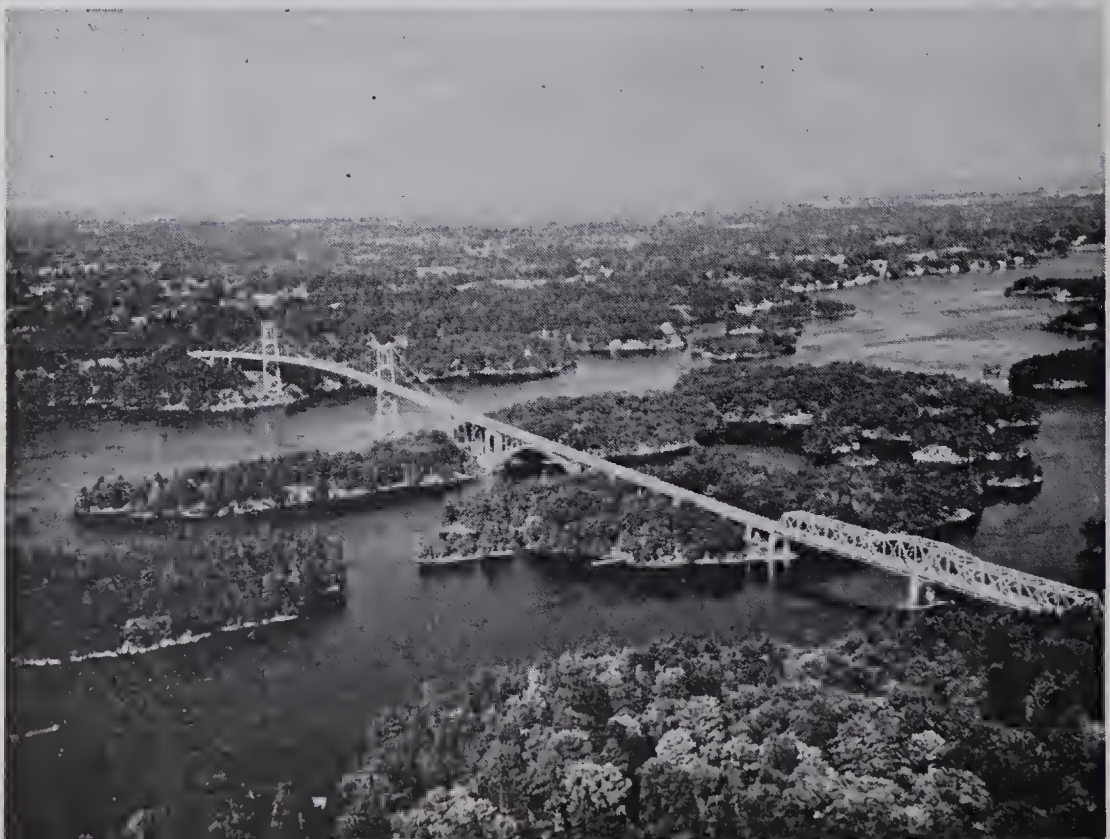
*Many new parks have been established along the shores of Lake St. Lawrence. The most famous of these is Crysler Farm Battlefield Park, with the adjoining Upper Canada Village. The church there was built in 1837 and, in 1959, was moved on wheels from the old village of Moulinette which was flooded when the Seaway was built. This church is one of many buildings moved there from various parts of eastern Ontario. Upper Canada Village is an historic centre intended to remind Canadians how their pioneer ancestors lived and worked.

2—8 The International Peace Bridge and part of the Thousand Islands National Park (Canadian Government Travel Bureau photo)



5. (a) Which city is located where the St. Lawrence River flows out of Lake Ontario? Name the two largest ports on Lake Ontario.

(b) Between Lake Ontario and Lake Erie is the greatest single obstacle to navigation in the whole St. Lawrence-Great Lakes system. This occurs at Niagara Falls, shown in Figure 2—9. In the photograph, we see the great Horseshoe Falls where the Niagara River tumbles 165 feet into the gorge. To the left are the American Falls, separated from the Horseshoe Falls by Goat Island. These falls are 14 miles from the mouth of the Niagara River. Refer to the profile in Figure 2—6 again and state the total rise in elevation from Lake Ontario to Lake Erie. Name the canal that has been built around the falls. How many steps must a vessel take up the locks to reach Lake Erie from Lake Ontario?

(c) Although Niagara Falls is an obstacle to navigation, it is also a source of tremendous wealth to Southern Ontario. State two reasons why this is true. Figure 2—26 will help to answer this question. For many thousands of years, Niagara Falls has been slowly eating its way up the Niagara River, so that it is now seven miles back from the bluff (called the Escarpment) over which it once fell. Since 1764, it has cut its way back 850 feet to the present rim. Because it is still receding at a rate of two feet per year, engineers have made plans to slow down this rate of cutting, by controlling the flow of the water.

6. Lake Erie is the most shallow of the Great Lakes. Parts of the channel through it must be kept open by constant dredging. The shoreline is quite straight, with few good harbors. Study Figure 2—2 again and note the location of the cities in this part of Southern Ontario. Why are no large ones located on the north shore of Lake Erie?

7. (a) What is the difference in elevation between Lake Erie and Lake Huron?

(b) Refer to Figure 2—2 and name, in order, the three bodies of water through which a "laker" must pass in the westbound trip between these lakes. Name two important cities of Southern Ontario that a vessel must pass on such a journey. This is one of the busiest water routes in the world. Vessels pass

2—9 Niagara Falls (Ontario Department of Travel and Publicity photo)

these cities at the rate of one every 20 minutes during the navigation season. Constant dredging is necessary to keep the channels open.

8. (a) At what place do vessels pass from Lake Huron to Lake Superior? The most westerly lock in the Seaway system is located here. This lock exists to bypass rapids in the river that connects the two lakes. Name this river.

(b) The "Soo" Canal is shown in Figure 3—24. How many canals exist on the United States side of the river?

(c) What is the rise in elevation between Lake Huron and Lake Superior?

(d) Name the "twin cities" which serve as ports at the western end of Lake Superior. Refer to Figure 3—26 for a view of one of these ports. How does grain from the prairies reach these ports for shipment to other Great Lakes ports and to Montreal?

(e) How many feet does a vessel rise between Montreal Harbor and Lake Superior?

This study of the Great Lakes-St. Lawrence system has provided some answers to the questions on page 18. Raw materials and other goods must be brought from many parts of the world to feed the people and to supply the industries of Southern Ontario. Manufactured goods are shipped out to many parts of Canada and to other countries. How does the great inland waterway assist this movement of goods? The processing of goods requires much power. Name three places along the waterway where vast quantities of power are supplied.

THE NIAGARA REGION

This is the smallest, the most densely populated, and one of the longest-settled regions of Southern Ontario. Study Figure 2-10 and name its limits to the north, the south, and the east. To the west, the city of Hamilton is included in the region. From there, a line running due south to the shores of Lake Erie forms a convenient western limit to the Niagara Region.

Even so small a region as this can be divided into still smaller regions. Of these, the Niagara Fruit Belt is the most famous. Figure 2-11 is a picture of Mr. White's farm, located in Louth Township, Lincoln County, in the heart of the Fruit Belt. Figure 2-12 is a map of the farm and Figure 2-13 is a *topographic* map of the district on the 1:50,000 scale.*

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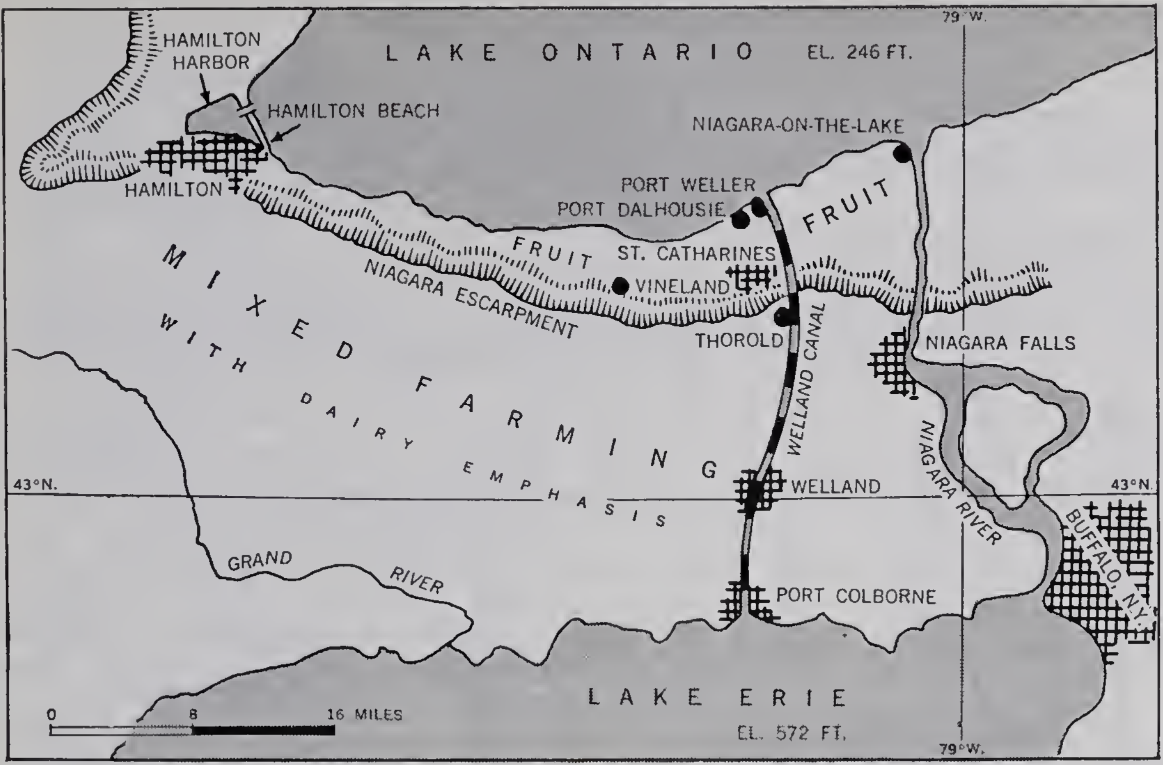
*The farm map and picture and the accompanying account have been supplied through the courtesy of Messrs. J. W. McCullough and R. Wilcox of the Extension Branch, Ontario Department of Agriculture, Vineland, Ont. As the farm owners wish to remain anonymous, a fictitious name has been used.

A topographic map shows relief and many other features, both natural and man-made, in great detail. The scale means that one inch on the map stands for 50,000 inches on the ground. Such a scale is often written as $\frac{1}{50{,}000}$ which is called the representative fraction. This scale means that one inch stands for about 4/5 of a mile. It may also be expressed by saying that 1¼ inches stand for one mile.

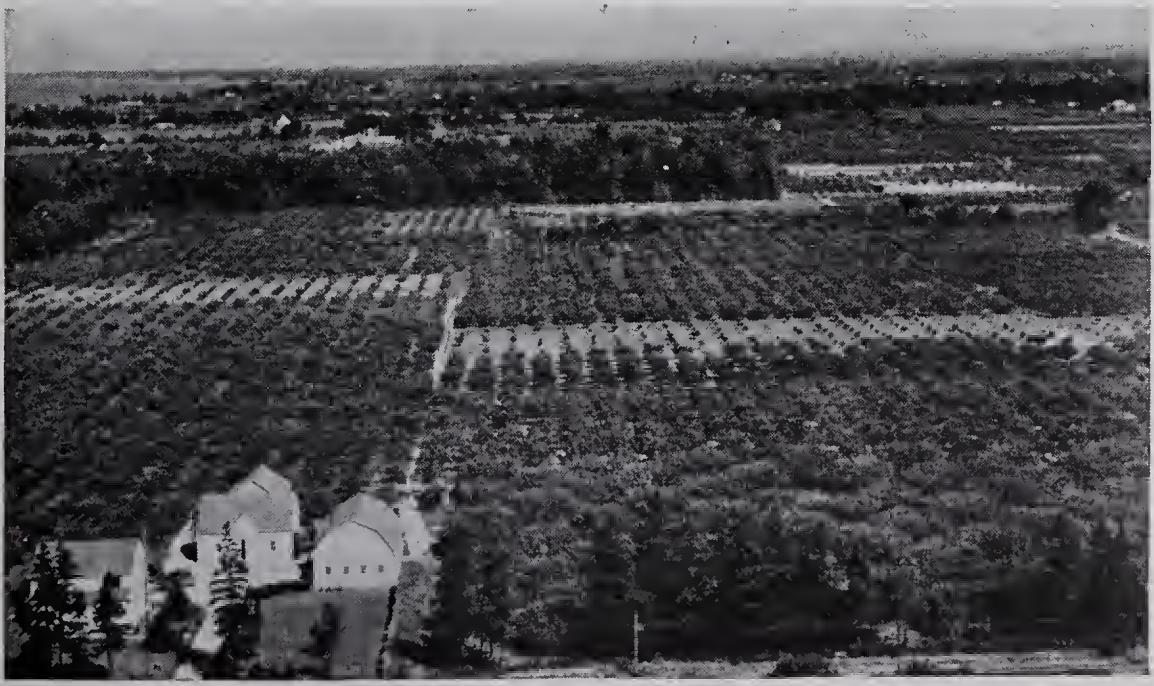


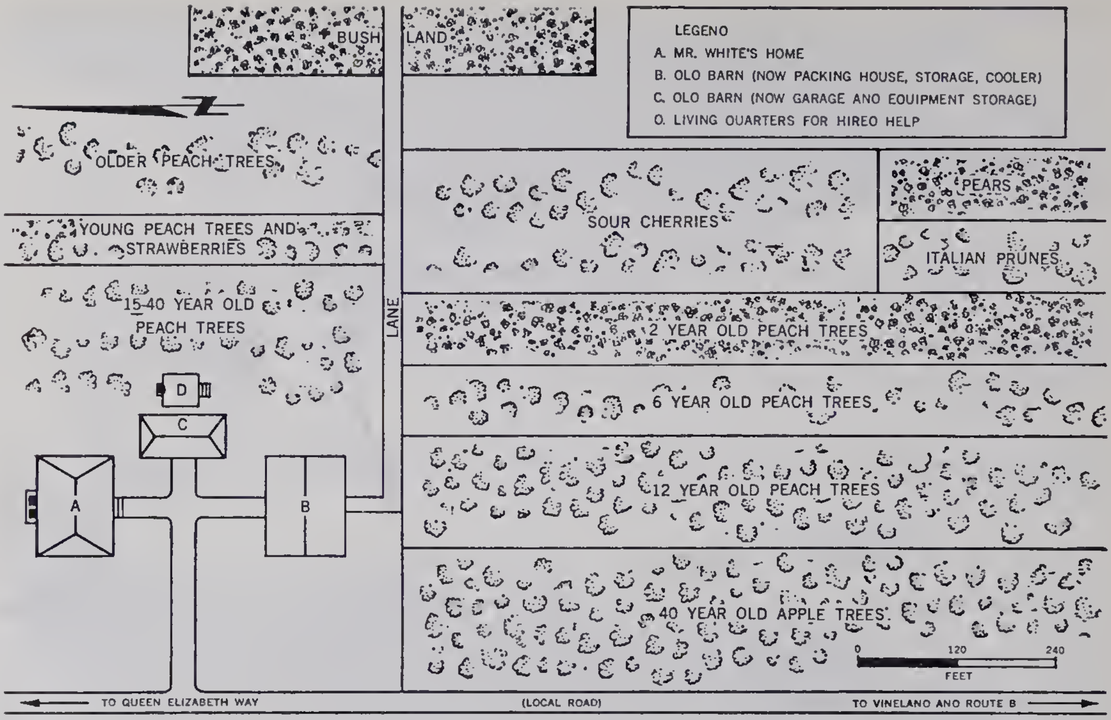
2—10 General map of the Niagara Region

A visit to Mr. White's farm in the Niagara Fruit Belt

1. Describe the relief of the land on Mr. White's farm, according to the photograph. How can you tell that most of the trees were planted by man and that there is little natural woodland?
2. Locate Mr. White's farm in Figure 2—13.
(a) In which direction and how far from the farm is the village of Vineland?
(b) Where is the Provincial Experimental Farm in relation to Mr. White's farm? In which direction is Lake Ontario? How far is the White farm from the lake?

2—11 Mr. White's farm (Ontario Department of Agriculture photo)





2—12 Map of Mr. White's farm

2—13 (opposite) A topographic map of the Vineland area in the Niagara Fruit Belt (scale is 1:50,000. From Sheet 30M/3 West half. National Topographic Series)

3. Locate Vineland in Figure 2—10. About how many miles east of Hamilton and west of St. Catharines is it?
4. According to the map of the farm (Figure 2—12), what crop takes up most of Mr. White's land? Name five other crops grown.
5. (a) According to both map and photograph, how does Mr. White get to the back of his farm?
(b) What are the tall trees behind the orchards at the rear of the farm? In which direction does this part of the farm lie from the house?
6. (a) Compare the land use on the map with that on the photograph. Note that both show the farm as it was in 1960. Since then, Mr. White has expanded his strawberry acreage, and made a few other small changes.
(b) Use the map to identify the buildings on the farm. No livestock are kept. How does the map indicate that animals used to be kept there? What work is done in the large building opposite the farm home?
(c) Farms in this densely populated rural area are usually supplied with modern conveniences such as piped water and hydro-electricity. Is there any evidence of these services in the photograph?

Mr. White and his family are descendants of Mennonite farmers who came from Lancaster County in Pennsylvania after the American Revolution.* The present family has held the farm for five generations, since the 1870s. At that time, grain growing, dairying, and general

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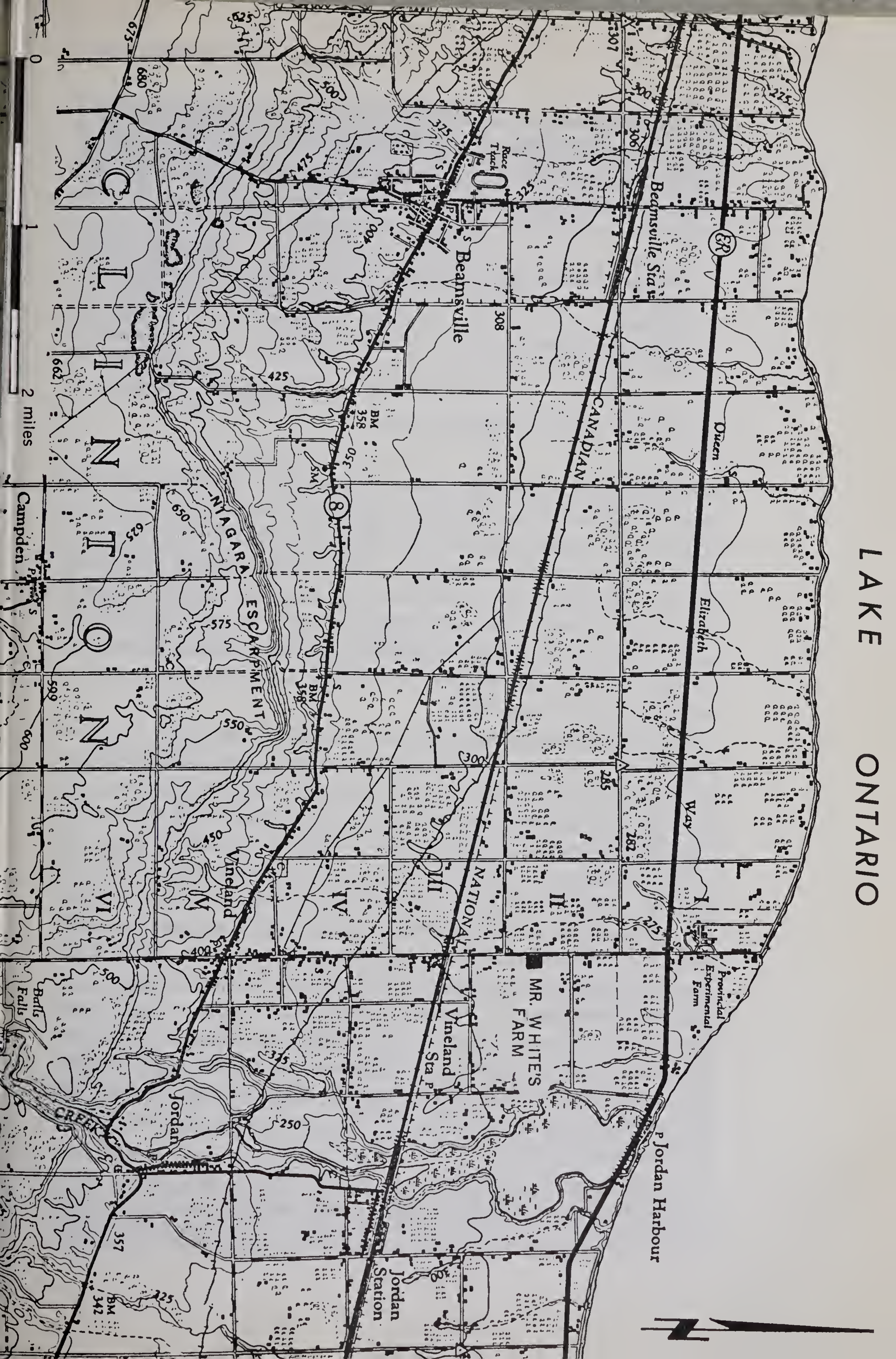
*The settlers bought the land from soldiers who had fought for King George III. The Mennonites were attracted by cheap land and by a desire to continue life under the British flag. They had lived in Pennsylvania as the descendants of thrifty and industrious farmers who had come to North America from Switzerland and southern Germany during the period 1700 to 1725.

LAKE ONTARIO
LINCOLN
Beamsville
Beamsville Sta
Race Track
Queen Elizabeth Way
QE
CANADIAN NATIONAL
NIAGARA ESCARPMENT
8
BM 358
BM 358
Vineland
Vineland Sta
MR. WHITE'S FARM
Provincial Experimental Farm
Jordan
Jordan Station
Jordan Harbour
CREEK
Balls Falls
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225

farming accounted for most of the land use. About 1912, apple production became important. After 1920, peach growing developed. Until 1956, some dairy cattle, poultry, and a few horses were still kept on the farm. Land use is now accounted for as in the following chart:

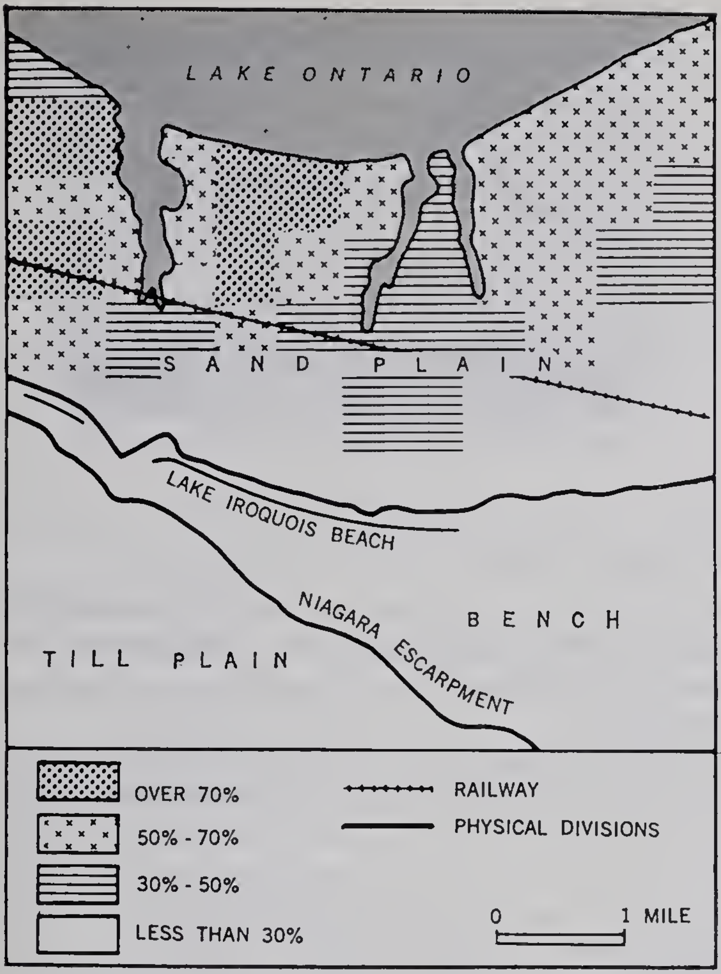
Peaches	About 30 acres
Strawberries (intercropped with peaches)	2-4 acres
Apples	2-4 acres
Cherries	3-4 acres
Prunes, plums, pears	1½ acres
Buildings, etc.	1½ acres
	42 acres*

2—14 Acreages of crops on Mr. White's farm

The changes in land use such as those on Mr. White's farm have occurred on most farms throughout the Fruit Belt. In 1846, grain was the most important crop in the region and little fruit was grown. Dairying then gained in importance, while grain declined. After 1881 the first important fruit production appeared and apples became a major crop. Finally, between 1900 and 1920, as competition from apple orchards in British Columbia and Nova Scotia developed, farmers turned to the production of peaches, pears, plums, cherries, and other fruits grown today.

The White farm is larger than the average in this area. Most are about 25 acres in extent. The land there is very level and the soils are well-drained, sandy loams. These were laid down in former Lake Iroquois, a glacial lake that existed there after the end of the last Ice Age. Study Figure 2-15, which shows where most fruit is grown in Louth Township. The map also illustrates the main soil types in the area. The *sand plain* is found on the level floor of the old glacial lake. How far south of Lake Ontario was the shoreline of Lake Iroquois? The sandy soils make the best fruitland in Canada. Some of the plain, however, consists of heavy clay soils which are not easily drained. On such poor soils, only 3.5 tons of peaches can be raised on each acre. On the best soils, such as those on Mr. White's property, seven to ten tons can be raised. However, such yields are possible only because large quantities of fertilizer are applied. Refer to page 35 and note how much Mr. White spends on fertilizer each year. How much does this average per acre?

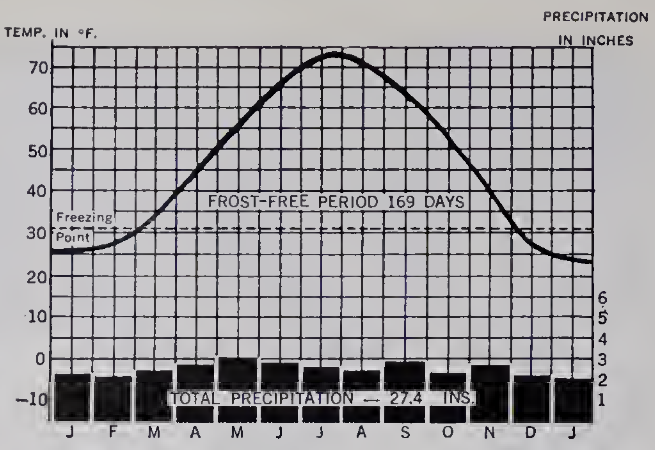
*Have you ever wondered how big an acre is? If you measure off a square area with each side 209 feet in length, you can see for yourself. This is large enough for several city building lots. If it were an orchard on Mr. White's farm, there would be room enough on it for 50 apple trees. Is your school playground smaller or larger than an acre?



2—15 Physical regions and percentages of acreage devoted to fruit growing in Louth Township, Niagara Peninsula (after Ontario Department of Agriculture)

South of the sand plain, lies rolling, higher land called *bench land,* just below the *Niagara Escarpment.* The Escarpment is a bluff that is easily identified on the topographic map (Figure 2-13). The bench land and the till plain above the Escarpment consist of soil deposited by glaciers. It is poorer soil than the sand plain but the vine flourishes especially well in the sandy loams and gravels, as do field crops (hay, oats, etc.) and dairy herds. What indication does Figure 2-15 give that fruit is much less important there than on the sand plain?

Mr. White finds that most fruit, especially peaches, grows well in the climate of the Fruit Belt. In fact climate, temperature particularly, is the most important factor in the location of orchards there along the shore of Lake Ontario. In spring, the lake keeps temperatures slightly lower than above the Escarpment. This delays blossoming by one or two weeks until after the last frost. After that, the blossoms are no longer in danger of damage. In the late summer and early fall, the lake delays the first frost, so that fruit is seldom damaged before the harvest. The fact that the land slopes downward to Lake Ontario also helps to protect the trees. Cool night air "drains" past the orchards towards the lake.



2—16 The climatic graph of St. Catharines

The climate of the Fruit Belt (Figure 2-16)

1. St. Catharines is one of the few places in Canada that has two months with average temperatures above 70°F. Name these two months.* Compare the July average in your neighborhood with that for St. Catharines. (Your local weather bureau can supply this information.)
2. How many months have average temperatures below freezing? Compare the January average temperature at St. Catharines with that in your area or at Winnipeg.
3. The frost-free period at St. Catharines, or the number of days between the last frost in spring (May 5) and the first frost in autumn (October 21), is 169 days. This is the period during which farmers can safely plant their crops. How long is the frost-free period in your neighborhood?
4. (a) What is the total annual precipitation at St. Catharines? Precipitation includes rain, snow, hail, sleet, etc. How does the total at St. Catharines compare with that for your neighborhood?
(b) It is important to know how precipitation is distributed. If most of it occurs in the winter, summers will be dry and irrigation will probably be necessary. How is the precipitation distributed at St. Catharines? Mr. White never needs to irrigate his land, but some farmers in the district must water their strawberries, using aluminum pipes and overhead sprinklers.
5. St. Catharines receives about 38 inches of snow during an average winter. **Meteorologists**** count ten inches of snow as the equivalent of one inch of rain. What is St. Catharines' snowfall expressed as rainfall?

It is important to realize that all climatic statistics are *averages*. In any given year, conditions may be very different from those suggested by the averages. For example, the spring of 1961 was an unusually wet one in the Niagara Fruit Belt. On April 24th of that year, one newspaper carried the following headline:***

---

*These averages are based on the average of the highest and lowest temperature for each day of each month. Official temperature readings are taken from a thermometer suspended in the shade, four feet above the ground. If the "high" on July 6th was 86°F. and the "low" was 72°F., what was the average temperature for that day?

**Meteorologists are scientists who study and attempt to forecast the weather.

***Material provided here from news stories has been made available through the courtesy of the Hamilton *Spectator*.

'APRIL SHOWERS' STALL FARM WORK IN AREA

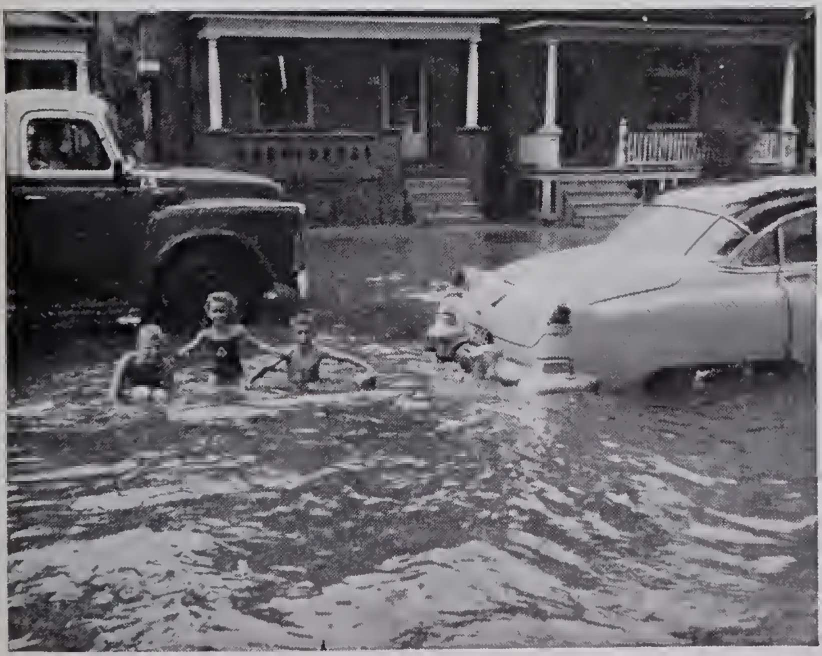
"Farms in the area are near idle, their land sodden and work impossible because of continual April rains. . . . City weatherman Jack Wingfield pointed out that the area has been rain-free only eight out of the first twenty-four days of April."

What is the average rainfall for April at St. Catharines? Is April an unusually wet month? In the same news stories, conditions in various counties of the Niagara Peninsula were described. In Haldimand County, total rainfall by April 24, 1961, was 5.89 inches. The amount by the same date a year earlier, had been only 3.3 inches. In Lincoln County (where Mr. White lives), farmers were described as "idle and getting anxious."

Much summer rainfall occurs during electrical storms in the Niagara Peninsula and throughout Southern Ontario. On August 10, 1961, a news story described a severe storm that upset boats, flooded homes, and damaged crops. Figure 2-17 shows children playing on a flooded street in Hamilton. Estimate the depth of the water on this street. The news story reported:

"The storm slowed traffic on the Queen Elizabeth Way to a snail's pace . . . Lake Ontario was turned into a swirling sea. In Toronto Township, grain and fruit crops were badly hit by hail, causing thousands of dollars in damage, and nine head of cattle were killed when a bolt of lightning struck a nearby tree."

Snowfall in the Niagara Peninsula is not heavy in comparison with many parts of Canada. Montreal receives more than 100 inches of snow in an average winter. Compare this amount with that received



2—17 Flooding that occurred on a Hamilton street after an August thunderstorm (Hamilton **Spectator** photo) at St. Catharines. Some winter precipitation falls as sleet and freezing rain. Ice storms occur occasionally during the winter. On March 9, 1961, a news story carried the following headline:

> **HUNDREDS WITHOUT HEAT AND LIGHT**
>
> "Hundreds of homes in the Hamilton district started today without heat or light when ice-crusted power lines snapped and set fire to hydro poles."
>
> "Hamilton missed the heaviest snow carried by yesterday's storm. Toronto collected five inches and Hamilton 2.3 inches. Another third of an inch of rain, hail, and freezing rain fell. . . . During the storm . . . 900 tons of salt, 800 tons of sand, and 78 tons of cinders were used on city streets. . . . During the early afternoon when winds were gusting to sixty miles per hour, the police department switchboard received many calls reporting toppling television aerials and trees falling across streets. . . ."

How does the climate affect Mr. White's work?

1. State some climatic hazards that Mr. White is likely to face on his farm.
2. (a) List the various climatic factors (temperature, precipitation, growing season) that favor fruit growing on his farm.
   (b) How does Lake Ontario help to make conditions more favorable for fruit growing?
3. Why must figures such as those in Figure 2—16 be treated very carefully?

Seasonal operations on Mr. White's farm are shown below and on page 35.

> 1. **January-March:** Pruning gets under way before New Year. Apples are pruned first and peaches last (in March). Most brush is removed from orchards and burned. Some is left on land. Dormant spraying of peaches takes place.
>
> 2. **April-May:** Spring fertilizers (ammonium nitrate and minerals) are applied. New trees are planted about April 15 if soil is fit to dig. Strawberries are planted towards end of April.
>
> Cultivation of orchards occupies much time in late April or early May, before blossoming. Brown rot (fungi) is destroyed this way. Fungus diseases are serious problems in this climate. Pre-blossom spraying is necessary.
>
> Spraying continues at 10-12 day intervals throughout season until harvest. In wet seasons, weekly spraying may be necessary.
>
> Tilling continues regularly throughout blossom period, May and early June.
>
> 3. **June-July:** Strawberry harvesting, June 10-July 1. About 30-40 pickers are employed, mainly housewives and high school students. A good picker can average 130 quarts a day.
>
> After harvesting, patches are renovated, July 10-15. They are clipped with mower to within 2"-3". About 1000 lbs. of fertilizer are applied per acre. Rows are set about 12-14 inches apart.
>
> Sweet cherries are harvested from July 1-15. Thinning of peaches (to improve quality) takes place at this time. Rubber hose is used to beat peaches off tree. These peaches are used to improve soil. Late June, rye grass is planted in orchards to build soil and help harden trees for winter. Sour cherries are harvested, July 20-25.

4. **August-Sept.:** Early peaches are harvested in late July and early August. Main peach harvest is August 25-September 10. Pickers are paid for harvesting on an hourly basis, because careful harvesting is necessary as only peaches "just right" for picking should be taken. If peaches are in oversupply, they can be stored in cooling shed for 7-10 days. Plums, prune plums, and pears are harvested early September.
5. **October-December:** Apples are harvested, September 25-October 10. From October 15-November 1 is "slack" time, when Mr. White takes a vacation. Orchards are cleaned up in November — broken limbs removed, weeding, old trees pulled out, etc. By end of December, pruning is under way again.

Around the year on Mr. White's farm

1. When is pruning done?
2. What is meant by cultivation of the orchards? What is its purpose?
3. How does Mr. White try to (a) maintain the fertility of his soil? (b) combat plant diseases?
4. Name the first crop to be harvested. How many acres are devoted to this crop?
5. When and how are the strawberry patches prepared for the following year?
6. Name two kinds of cherries grown on the farm. What is the combined acreage devoted to them? When are they harvested?
7. When, how, and why are the peaches thinned? What is done with the peaches thus removed? What fraction (or percentage) of total acreage is in peach trees?
8. How long is the peach season? Strawberry and cherry pickers are paid on a **piecework** basis — that is, each is paid according to the amount of fruit he picks. Peach pickers are paid an hourly wage. Why are they not paid on a piecework basis?
9. Why is the "cooler" of such importance in early September? What other crops besides peaches are harvested at this time?
10. When are the apples harvested?
11. When does Mr. White take his annual vacation?
12. What work is done in the orchards in November?

Two thirds of Mr. White's peach crop is sold as fresh fruit. The rest is sold for processing, under contract to five local canneries. Throughout the Fruit Belt, about half the crop is sold fresh and half for canning. Growers are responsible for transporting their crops to markets. Peaches are picked into six-quart baskets in the orchards. They are taken by truck to the packing room where five workers sort and pack them. In selling fresh fruit, the packed peaches must present a pleasing appearance in the baskets.

Important farm expenses in 1960 included the following:

Labor (wages of pickers, etc.)	$7660
Containers	3878
Fertilizer	2620
Taxes	1000

2—18 The main sources of Mr. White's income for 1960

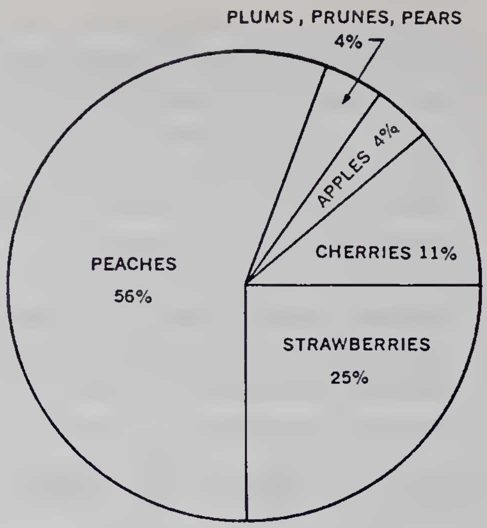
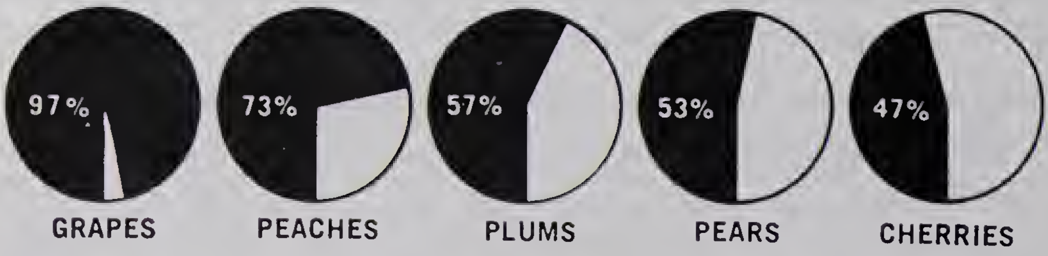


Figure 2-18 shows the main sources of Mr. White's income. How much is accounted for by peaches? By peaches and strawberries together? Besides his investment in land and buildings, Mr. White owns considerable equipment. This includes a tractor, a sprayer, a mower, a truck, pallets, racks, and various items of small machinery. Town water and hydro-electricity are used on this farm.

In 1961, Ontario possessed about 45 percent of Canada's total fruit acreage, and accounted for about half the value of all fruit sold in the country. The Niagara Fruit Belt accounted for about one fourth of Canada's fruit acreage, and about the same fraction of the value of all Canadian fruit.

A further detailed study of the district in which Mr. White's farm is located can be made from the topographic map (Figure 2-13) already referred to. On this map, we can see the limits of the Fruit Belt between the Niagara Escarpment and Lake Ontario. The Escarpment is shown by the many dark *contour lines*, packed closely together, that extend across the middle of the map from west to east. About how far is the Escarpment from Lake Ontario?

Study the contour line labelled "400" near the village of Vineland. *Every point on this line is 400 feet above sea level.* Since the surface of Lake Ontario is 246 feet above sea level, about how many feet above the lake is Vineland?



2—19 Niagara fruit production as percentages of Canadian total

Find the contour line marked "300," north of Highway 8, near the railway tracks. The elevation of the land drops as the lake is approached. Notice that the 300-foot contour line is near Vineland Station. Measure the distance between Vineland and Vineland Station, using the scale in which 1¼ inches stand for one mile. What is the drop in elevation in this distance? From Vineland Station to the lake, there is a further drop of 54 feet (300 minus 246). These facts show that the land there is nearly level. *When contour lines are spaced far apart, the surface of the land is usually gently sloping.*

In the centre of the map, near Highway 8, are some figures that read "BM 358." "BM" stands for "bench mark" and is a point where the exact elevation was worked out by the map surveyors.

South of "BM 358," the Niagara Escarpment is indicated by many contour lines very close together. On a colored map, such as Figure 2-23, on page 42, these lines appear brown. *When contour lines are spaced closely together, the land is steeply sloping.* In Figure 2-13, place your pencil on the contour line that runs through the "8" of Highway 8. This line is 400 feet above sea level (as indicated west of Vineland). Move your pencil southward from "8" towards the letter "N" of Niagara Escarpment, remembering that the *contour interval* (or difference in elevation between two adjacent contour lines) on this map, is 25 feet. By counting from 400 at Highway 8 and adding 25 feet for every contour line crossed, it will be clear why the line on top of the Escarpment is marked "650." Here, in a distance of only one mile, the land has risen by 250 feet (from 400 to 650 feet). Notice that most of this rise has taken place within one eighth of a mile (only 220 yards), where the land rises suddenly from 500 to 600 feet. Above the Escarpment, the land becomes quite level again. How does the map indicate this? The highest point on the map appears in this section, nearly two miles south of Beamsville. It is shown as a spot height. What is this elevation?

This study of topography has shown that the area can be divided into two parts:

Level land *below* the Escarpment, where elevations range from 246 to 400 feet.

Level land *above* the Escarpment, where most elevations are above 600 feet.

The topographic map of the Niagara Fruit Belt (Figure 2-13)

1. Name the two main roads and the railway.

(a) Are these located above or below the Escarpment? In which general direction do they run?

(b) Trace the route of the Queen Elizabeth Way on Figure 2—13. The Niagara Peninsula is one of Canada's chief transportation "corridors." Use an atlas or wall map to trace the route from Toronto to New York City via this corridor. Why is the Queen Elizabeth Way able to follow such a straight route through the Fruit Belt?

2. Study the other roads on the topographic map.

(a) Why are there so many roads in the Fruit Belt?

(b) What happens to many of the roads where they meet the steepest part of the Escarpment?

(c) Notice that only two main roads go from north to south on this map. Through which villages does each pass? Do these roads cross the steeper or gentler slopes of the Escarpment?

3. Notice that the roads make a pattern of rectangles. This is related to the way in which the land was divided when the settlers first came here. It was divided into **counties** and **townships**. The townships were divided into rectangular sections.* Compare this with Figure 4—5 on page 139 which shows how the land of Quebec was divided by the early French settlers. Different survey systems cause the landscape of Ontario to look very different from that of Quebec to this day.

4. List the names of all the villages and small settlements shown on the map.

(a) Are most of them above or below the Escarpment?

(b) Which is the largest of these settlements?

(c) What information on the map explains why a village has grown up at each of these places?

(d) Where do the children who live near Beamsville Station attend school?

(e) Did the larger villages become established before or after the railway was built through the Fruit Belt? Explain your answer.

5. Study the distribution of the houses and farms outside the settlement.

(a) What is most noticeable about their location?

(b) Is settlement more dense above or below the Escarpment?

(c) Which village has a name that suggests that the land is devoted to fruit growing? **Place names are sometimes a source of geographical information.**

Here is a summary of some of the main things the map has indicated about the Niagara Fruit Belt.

1. A steep bluff or escarpment extends from east to west across the region. This bluff lies two to three miles south of Lake Ontario.
2. Below the Escarpment, to the north, the land is quite level and averages about 300 feet in elevation above sea level. Above the Escarpment, to the south, the land is also quite level, but is higher, averaging about 600 feet above sea level.
3. There are a number of villages and small settlements in this area. All but one are located below the Escarpment.
4. Outside the villages, most houses and farms are located along the

---

*Your class will wish to study the topographic map of the area in which you live. The map can be obtained for 30 cents. If you live in Ontario, locate your township on the map. On this scale, you may be able to locate your school and the street on which you live.

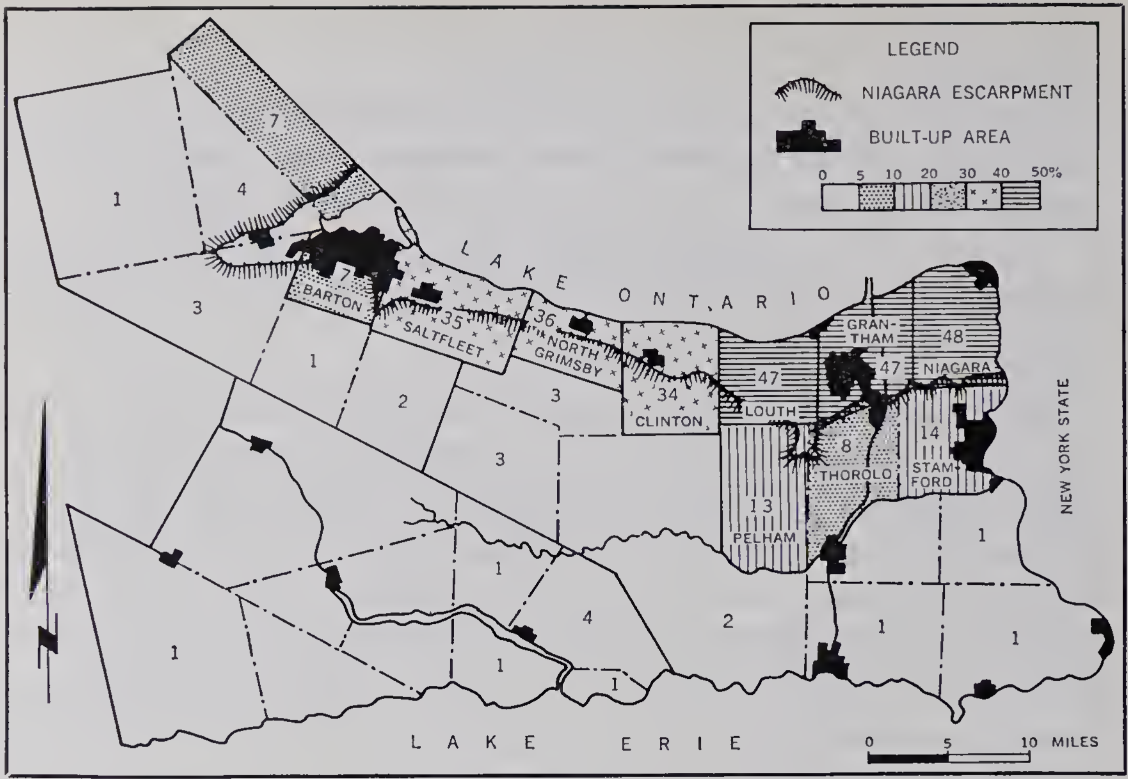
roads. There are many more houses and roads below than above the Escarpment.

5. Roads are numerous and remarkably straight. Two main roads and a railway cross the Fruit Belt below the Escarpment. Only two roads cross the Escarpment, in each case using the gentler slopes.

6. The orderly arrangement of trees, the name "Vineland," and the presence of an experimental farm tell us that agriculture, especially fruit growing, is probably important there.

The Niagara Fruit Belt is a region of rapidly expanding towns and cities. This creates several problems for farmers such as Mr. White. Labor costs are high, as he must compete for workers with stores and factories that can pay high wages. The rapidly growing population requires roads, sidewalks, piped water, electricity, and schools. This causes taxes to be very high. How much property tax does Mr. White have to pay? Many farmers have sold their land. Mr. White enjoys farming and does not wish to give it up, although some farmers near St. Catharines have received as much as $3000 per acre for their land in recent years. Figure 2-20 shows a vineyard located beside suburban housing, east of Hamilton. The houses in this photograph are built on land formerly used for fruit cultivation. At present, about 300 acres of valuable fruitland are being lost in this way every year. This is a problem that should concern all Canadians. In no other part of Canada is there better land for growing fruit, especially peaches. These fruitlands are near the largest constantly growing food markets in Canada. Studies have shown that much of the problem results from the building of factories and houses on good soils, when poor soils would be equally satisfactory. Proper planning would help to solve this problem. Steps must be taken soon for, at the present rate, the Fruit Belt

2—20 Grapevines and new suburban housing side by side in the Niagara Fruit Belt



2—21 Fruit and vegetables as percentage of occupied farmland in 1951

may disappear within 40 years! Even proper planning, however, will create severe difficulties. For example, if a farmer's land consists mainly of good peach soils, should he be prevented from selling it as he pleases? If he is not allowed to sell it, should he be compensated for the money he "loses"? These are not easy questions to answer.

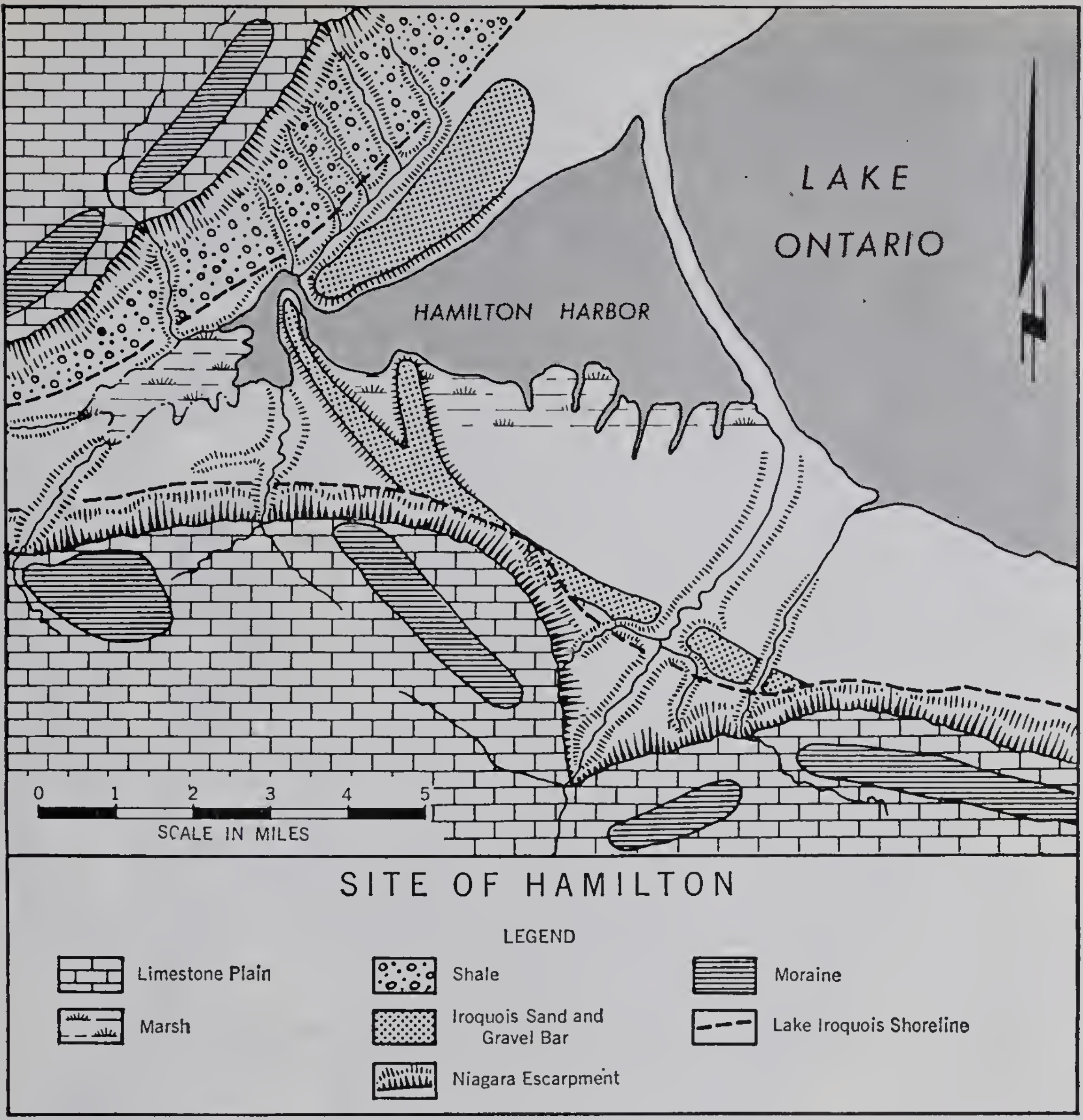
How farmland is used in the Niagara Fruit Belt

1. Figure 2—21 shows fruit and vegetable lands as a percentage of occupied farmland. Which three townships have the highest percentages of farmland devoted to fruit and vegetables? What is noticeable about the location of townships having little or no land devoted to fruit and vegetables?
2. In what ways is Mr. White's farm (a) typical, (b) not typical of farming in the Niagara Fruit Belt?

In the western section of the Fruit Belt, towards Hamilton, *market gardening,* the growing of apples, and dairying are the most important activities. Here, as we have seen, the problem of the loss of good farmland to industry and housing is greatest. South of the Escarpment, as Figure 2-10 shows, mixed farming and dairying are carried on. Apples are an important crop along the shores of Lake Erie.

Hamilton: Industrial Capital of the Niagara Region

Figure 2-22 shows the *surface geology* of Hamilton. What two kinds of rock are found around the city? In addition, there are large *moraines,*



2—22 The surface geology of Hamilton. The present entrance to the harbor is man-made.

which are deposits of gravel, rocks, and other materials left long ago by glaciers. There are also deposits of sand and gravel left by Lake Iroquois. The waters of this lake were about 110 feet higher than those of Lake Ontario today. Trace the old shoreline of Lake Iroquois on the map. Another line shows the Niagara Escarpment. The top of the Escarpment is made of hard limestone, underneath which is soft shale. On the west side of the map may be seen a small part of the Dundas Valley, where rivers and ice carved a channel through the Escarpment. During the same period, the sand and gravel bar that separates Lake Ontario from Hamilton Harbor was formed. In fact, this bar created the fine harbor of ten square miles, the largest on the Great Lakes.*

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*This study of Hamilton is based partly on material produced by Professor H. A. Wood, Chairman, Department of Geography, McMaster University, Hamilton, Ont.

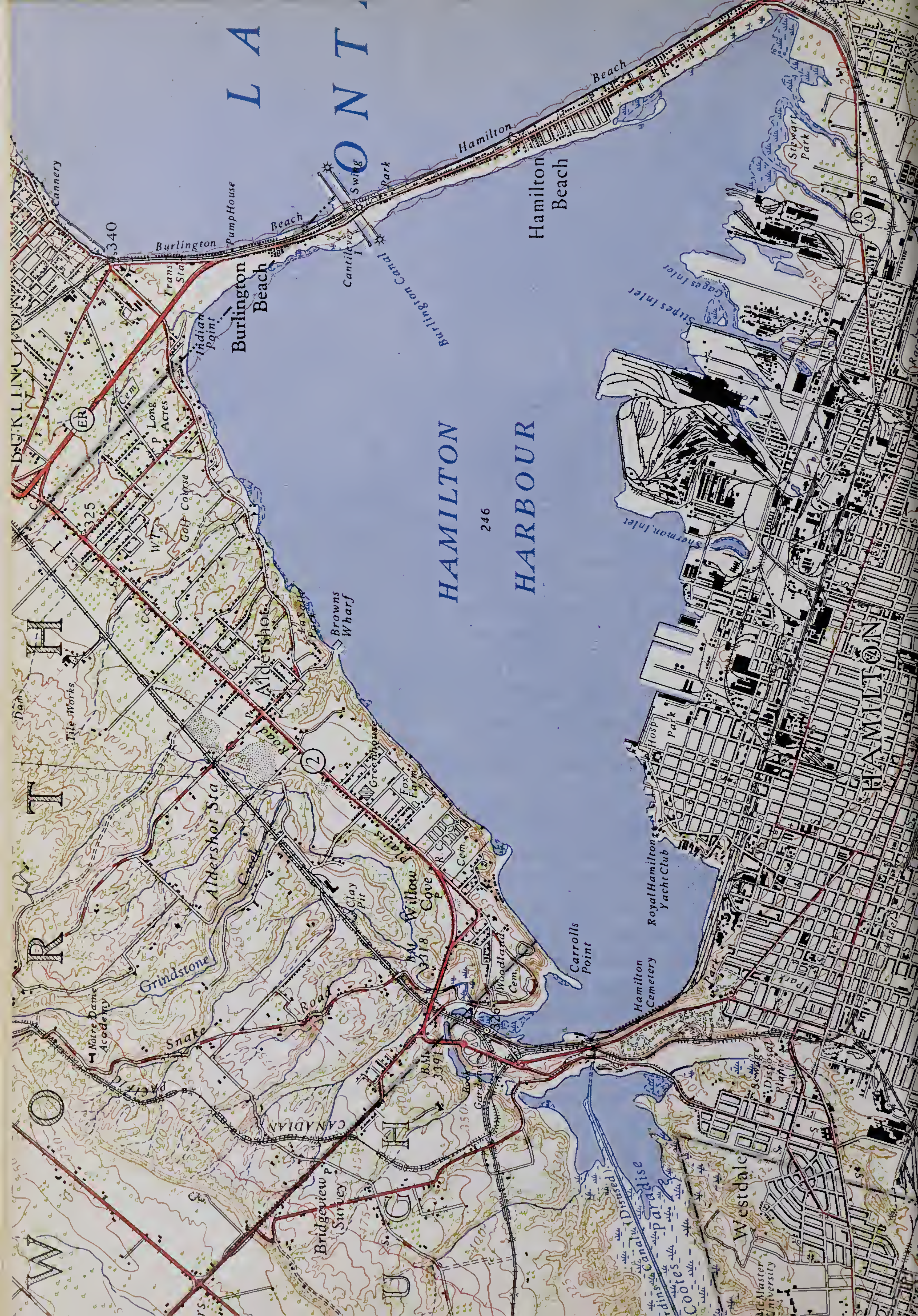

LA
ONT
HAMILTON
HARBOUR
246
Burlington Beach
Hamilton Beach
Burlington Canal
Cantilever
Swing
Park
Pump House
Burlington
Beach
Hamilton
Beach
Indian Point
Trans Sta
Cannery
340
BURLINGTON
ER
Long Acres
Cem
Golf Course
W T
325
W O R T H
Aldershot
Aldershot Sta
Plains Road
2
Greenhouse
Fox Farm
Browns Wharf
La Salle Park
Tile Works
Dam
Grindstone
Creek
Snake Road
Notre Dame Academy
Willow Cove
Clay Pit
BM 318
R.C. Cem
Woodland Cem
Carolls Point
Royal Hamilton Yacht Club
Hamilton Cemetery
Rock Gardens
B.M. 339
CANADIAN PACIFIC
Bridgeview Survey
Desjardins Canal (Disused)
Cootes Paradise
Westdale
McMaster University
Sewage Disposal Plant
Hosp
Park
Sherman Inlet
Stipes Inlet
Gages Inlet
Stewart Park
250
HAMILTON
E U C H

Figure 2-23 shows that the main part of Hamilton developed on the south shore of Lake Ontario rather than on the north shore. In one way, this development on the south side of the lake was a disadvantage because the north side would have put Hamilton on the main transportation route of Ontario that runs from the Quebec border via Toronto to London and Windsor. However, a location on the north side would have been much more difficult for the construction of houses and factories. How is this indicated by the topographic map? The fact that Hamilton is not on the main transportation route of Southern Ontario has helped the heart of the city to avoid many traffic problems that trouble other cities.

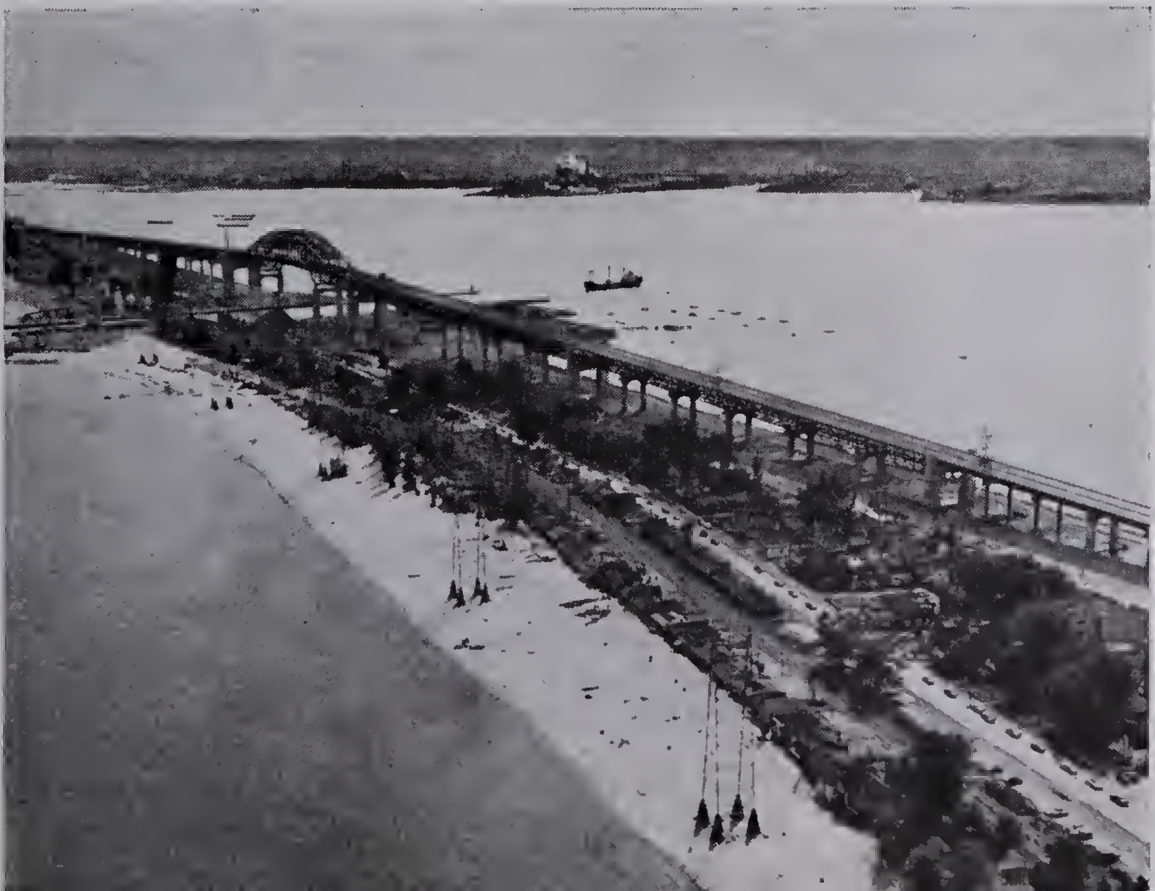
When, in 1813, George Hamilton planned the town that bears his name, he was able to avoid the marshy land along the shore of the lake, and the steep escarpment to the south of it. Later, the marshy land was available for industry, railway yards, and dock facilities. Because of the Escarpment, the city expanded eastward into the Fruit Belt, along a narrow belt less than three miles wide. This has created a serious problem due to the loss of valuable farmland.

The "site" and "functions" of Hamilton as shown on the topographic map and photograph

1. (a) What is the length of the bar that separates Hamilton Harbor from Lake Ontario? Figure 2—24 shows part of this bar.
(b) What evidence is there that this bar serves as a recreation area for the people of Hamilton?

2—23 (opposite) Part of a large-scale (1:50,000) map of Hamilton's harbor and hinterland (from Sheet 30M/5 West half, National Topographic Series)

2—24 Burlington Skyway and Hamilton Beach (Ontario Department of Highways photo)



(c) How does this bar help to reduce traffic congestion in Hamilton? In Figure 2—24, locate the great Burlington Skyway, where this high level road crosses the entrance to the harbor. What is this entrance called? The Skyway is 8400 feet long. Its central span is 120 feet above Lake Ontario. Why is it so high?

(d) What other features are evident in the photograph besides the Skyway and the Burlington Canal? What function of Hamilton is illustrated on the far side of the harbor? In the far background is the Niagara Escarpment. In which direction was the camera pointing?

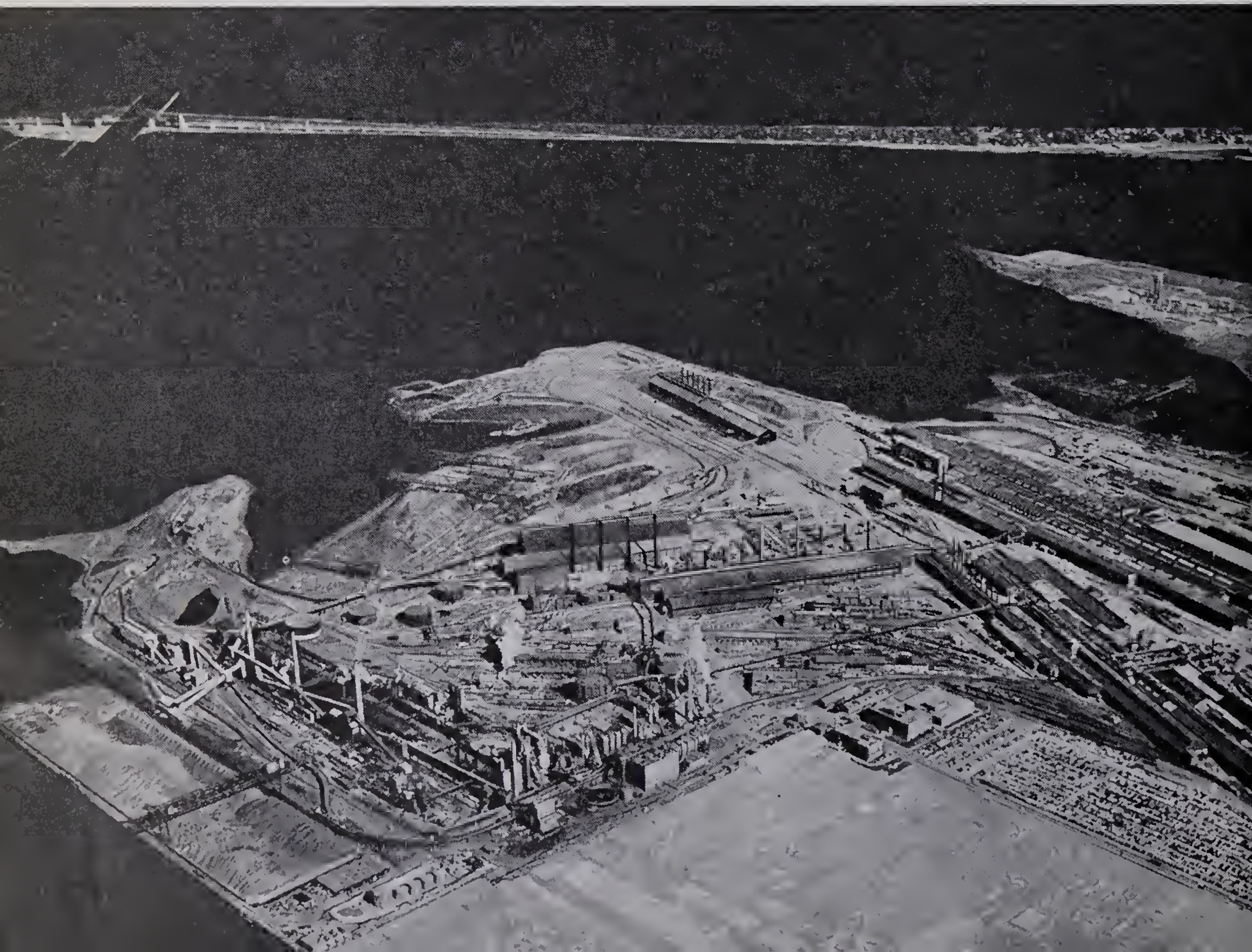
2. (a) What is the distance from the Royal Hamilton Yacht Club to the Burlington Canal?

(b) What is the elevation of the contour line that extends along much of the Hamilton waterfront?

(c) What indication is there that some of the harbor area consists of drained or reclaimed land?*

*A long range plan for the development of the harbor will require 1000 acres of land to be reclaimed from Lake Ontario. Reclaimed areas include shallow locations near the yacht club, around the iron and steel complex, on the east side of the harbor, and along the west side of Hamilton Beach. Thousands of tons of gravel will be pumped into the harbor as part of the reclamation work. The St. Lawrence Seaway has greatly increased the business of the harbor. Nearly 2000 ships call there each year. Iron ore is the main cargo imported.

2—25 An aerial view of the Steel Company of Canada property, part of Hamilton Harbor and Hamilton Beach (Steel Company of Canada Ltd. photo)



3. Figure 2—25 provides an aerial view of the Steel Company of Canada's great iron and steel development on the Hamilton waterfront.

(a) "Match" the iron and steel development with the same area on the map. Clue: locate Stipes Inlet on the map. The iron and steel development is **west** of this inlet.

(b) Name two features in the far distance (background) of this photograph that can be identified on the map.

(c) What means of transportation used by the iron and steel industry are evident in the photograph?

(d) Notice the piles of material in the lower lefthand corner of the photograph. What are these materials? Where have they come from? How were they transported to Hamilton?

4. Refer to the topographic map again and list some uses of the land along the north shore of Lake Ontario at Hamilton. Note that since this map was drawn, much of the farmland here has been occupied by housing and industry.

5. Describe the relief of the land to the northwest of Hamilton Harbor. How many creeks drain this area? What effect do they have on the land relief?

6. What evidence is there in the southwest corner of this map that Hamilton is an educational centre of some importance?

On the map, Westdale is noticeable as a suburb that is separated from the rest of Hamilton by a strip of low-lying, marshy land. A number of other suburbs and neighboring towns are separated from the downtown area in the same way. To the south of Hamilton, where the Niagara Escarpment acts as a barrier, other separate districts are found. Each of these has its own business, commercial, and shopping areas. This has prevented the downtown area of Hamilton from growing too rapidly. As a result, Hamilton suffers less from congestion and traffic problems than some cities of similar size. In addition, the downtown business area is not expanding into nearby housing areas too rapidly. The industrial areas of the city are concentrated along the low-lying waterfront. No other area is so suitable for industry. Industry has thus not expanded into either business or residential districts. For various reasons, the competition for land use is not as severe as in some cities.

The iron and steel development shown in Figure 2-25 is only one of several in the harbor area. Together, these make Hamilton the greatest producer of *primary iron and steel* in Canada. In fact, about half the nation's steel is produced there. "Primary" means "first" and refers to the first stage of steel production during which steel bars, steel plate, and blocks of steel called *ingots* are made. From primary iron and steel, other factories are able to make steel pipes, kitchenware, auto parts, machinery, and dozens of other goods that are known as *secondary* iron and steel products. Many of these products are made in Hamilton. About three quarters of the exports of Hamilton Harbor are made up of iron and steel goods.

Hamilton is very well located for an iron and steel industry. Its situation on the Great Lakes-St. Lawrence Waterway is probably the chief advantage. Coal is easily brought in from the United States, by barge and rail. Iron ore is imported from several mines in Northern Ontario and Quebec. Limestone, which is very important in the manufacture of iron and steel, is obtainable locally, from the Niagara Peninsula. Large quantities of water, used in the production of steel, are immediately at hand in Hamilton Harbor. A great deal of cheap electricity is also necessary. Where is this obtainable? In 1962, a large *thermal power plant* was under construction in Hamilton Harbor. Locate this plant in Figure 2-40. Refer to Figure 2-41 and to pages 62 to 63 for information on how electricity is produced thermally. In 1962, natural gas from western Canada was introduced to blast furnaces there. It marked the first time that a Canadian blast furnace was fired with natural gas.

It is important that the iron and steel industry be located close to markets or on transportation routes that easily carry goods to distant markets. Within 100 miles of Hamilton live nearly one fourth of the people of Canada. The *majority* of Canadians live within 500 miles of the city. With large markets throughout Ontario and Quebec, and with the chief water, rail, and road routes in Canada near at hand, Hamilton has an excellent location for its steel industry.

In addition to steel products of all kinds, the factories of Hamilton make electrical equipment, chemicals, food products, textiles, tobacco goods, and rubber goods. More than half the working population is engaged in manufacturing, the largest proportion for any Canadian city. Hamilton ranked sixth in size among Canadian cities in 1961, but third in manufacturing.* Six hundred factories produced a great variety of goods.

Although a major workshop of Canada, Hamilton is more than a factory city. It is a centre of business, finance, and education. It has taken advantage of its fine location between the Niagara Escarpment and Lake Ontario by setting aside four square miles of land for gardens and parks. Locate the rock gardens on the west side of the city in Figure 2-23. Most of the other parks are found to the south side of the city on the "Mountain" as local people call the Niagara Escarpment. Few large Canadian cities have such a high proportion of land devoted to parks and recreation.

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*Volume of manufacturing is measured by the selling value of goods produced by the factories of a city.

Discuss the following questions.

These are the kinds of questions that should be asked in a study of any industrial city.

1. Describe the physical site of Hamilton.
2. Where did the early settlers decide to locate the city? What are the advantages and disadvantages of this site today?
3. What are the main types of land use in the city?
4. How important has the harbor been in the development and present importance of Hamilton as an industrial city?
5. What sources of food, raw materials, and power are available to the city?
6. Describe the main functions and industrial importance of Hamilton today. In what respects is it well located in relation to markets?
7. Refer again to the questions given at the beginning of this chapter, on page 18. Explain how the study of Hamilton has helped to answer some of these questions.

The main industrial areas of the east side of the Niagara Peninsula are found along the Welland Canal. There, good road, rail, and water transportation facilities are available. As ships pass through the Welland Canal, they "climb the mountain" (that is, go up the Niagara Escarpment) a vertical distance of 325 feet, through eight locks. At Thorold (see Figure 2-10) they climb 140 feet. Measure the approximate length of the Welland Canal in Figure 2-10.

The first canal was built in this area nearly 150 years ago. William Merritt was one of the first men to see the importance to Canada of a channel around Niagara Falls. As a result, the trade and prosperity of Ontario were greatly increased. Giant "lakers" are one kind of ship that use the modern Welland Canal. These vessels can carry a cargo of wheat sufficient to fill *four miles* of railway freight cars (see Figure 2-41). The Welland Canal is one of the busiest and most important water routes in the world.

Cheap power from Niagara Falls is another asset of the eastern Niagara region. Figure 2-26 shows the Sir Adam Beck Generating Stations Numbers 1 and 2, on the Niagara River, six miles below Niagara Falls. This is the greatest hydro-electric development on one site in Canada. Notice the reservoir in the background of the picture. The flow of water is controlled so that the power development will not interfere with Niagara Falls. In this way, the Falls can be preserved as a major tourist attraction. Beautiful scenery and great natural wonders are important sources of wealth, not only because they earn millions of tourist dollars, but also because they bring relaxation and enjoyment to modern city dwellers.

The main industrial cities of eastern Niagara are shown in Figure 2-10. Note the convenient location of Port Colborne where iron and steel are made in blast furnaces. This is one of Canada's main centres for refining nickel. Cement is also manufactured at Port Colborne. Large grain elevators are located there. North of this town lies Welland, where steel products, electrical goods, textiles, and rubber goods are made. Near St. Catharines, the towns of Thorold and Merriton are two of the important pulp and paper centres in Southern Ontario.

St. Catharines, with nearly 84,000 people in 1961, is the most important city in the eastern Niagara Peninsula. Wage earners are employed in more than 100 industries of various kinds. These include the making of automobile parts, machinery, electrical goods, hardware, wines, and foods. The attractive climate of St. Catharines was illustrated in Figure 2-16. Using your knowledge of the Niagara Fruit Belt, which is the *hinterland** of the city, name some industries of St. Catharines that are based on the products of this hinterland. Suggest reasons why a major industrial city has grown up in this part of the Niagara Fruit Belt.

*Hinterland refers to the area around a city. This area is usually linked to the city by various transportation routes. The city often draws some of its raw materials and power from its hinterland. In turn, it may supply goods and services to the hinterland. Parts of the hinterland may be far removed from the city. Areas such as Labrador (which supplies iron ore to Hamilton) and Manitoba (which buys some of Hamilton's goods) may, in a sense, be considered part of that city's hinterland.

2—26 Sir Adam Beck Generating Plants Nos. 1 and 2 at Niagara Falls (Ontario Hydro-Electric Power Commission photo)

Port Dalhousie, located at the mouth of the old Welland Canal, and Port Weller are outlets for St. Catharines. The latter is noted as a shipbuilding centre. Some of the largest vessels on the Great Lakes were built there. These include the famous "lakers," already mentioned.

The eastern part of the Niagara Peninsula is one of the most historic areas of Southern Ontario. St. Catharines was founded by Loyalist settlers in 1790. Niagara-on-the-Lake is even older, and served as the capital of Upper Canada for a short time. Its beautiful tree-shaded streets, old churches, and fine colonial style houses take the tourist back to the early days of Ontario.

Orchards, quiet dairy farms, beautiful scenery, busy highways, old historic towns, a busy, yet scenic lakeshore, smoking factories, bustling cities, neat rows of modern bungalows – all these together make up the region called the Niagara Peninsula. In what ways is the region similar to the one in which you live? In what ways is it very different?

SOUTH-CENTRAL ONTARIO

This region cannot be easily separated from Niagara. In fact the whole strip of land from St. Catharines, on the south side of Lake Ontario, to Oshawa, on the north side, is often called the Golden Horseshoe. This strip of land is the most densely populated and industrialized part of Canada.

The northern shore of Lake Ontario, dominated by Toronto, is the heart of South-Central Ontario. The region extends north to Lake Simcoe, and east almost as far as Kingston. Locate the region in Figure 2-2 and name five other cities besides those already mentioned.

In 1803 Toronto, then called York, had just become the capital of Upper Canada, which was the early name for Ontario. From this tiny settlement has developed the second largest Canadian city, a great port, and industrial centre. Figure 2-27 shows a pioneer settlement in Upper Canada in the early nineteenth century. Land such as this has developed into the fertile farmland of Southern Ontario, the richest and most productive in Canada. It will be interesting to discover how the landscape of Ontario has changed in 150 years. It is also important to learn why Toronto has become the greatest city of Ontario, containing, within its metropolitan area, nearly one third of the people of the province.

We are very fortunate to have available many accounts of early pioneer life in Ontario. One of these is in the form of a letter written in 1832 by Thomas Radcliff. This pioneer had come to Upper Canada from Ireland and was writing home to his father.

2—27 Pioneer farming—the shanty in the bush (Public Archives of Canada photo)

> "We are now, thank God, in perfect health . . . and absolutely enjoying . . . a comfortable residence in our own loghouse, the timbers of which, about three months ago, displayed their leafy honours in the wild forest. It consists of a cellar, three rooms and a small store-room, in the principal story and two bed-rooms in the roof. . . . The edifice is thirty feet by twenty-five, from out to out. For the five rooms we have three flues and two stoves and mean to be very snug and warm. . . .*
>
> "I have discovered limestone . . . for building the stack of chimneys and plaistering the interior of the house . . . and it may answer very well . . . till I can build a framehouse of greater dimensions which I mean to do. . . ."

(Radcliff then explains that his land has a rolling surface except for some "flats" where it is drained by a creek or small river. It is well forested, and he aims to remove all trees except for some "ornamental timber" and a few maples. His letter continues.)

> "The quality of the timber denotes the richness of the soil. Ours consists of maple, beech, butternut, elm, white ash, hornbeam, a sprinkling of oak, and some cherry and basswood. . . . I find (the soil) to be, in surface, five inches of black vegetable mould, over a few inches of clay loam . . . and almost all my land of this description, is an extended level of wheat soil, without the least unevenness. The knowing ones who have seen it say it will give wheat forever; and speak of fifty bushels to the statute acre . . . .

*These extracts are quoted from *Authentic Letters from Upper Canada*, published by Macmillan in the Pioneer Books series, Toronto, 1953, and are reproduced here by kind permission of the publishers.

2—28 Pioneer farming—thirty years later (Public Archives of Canada photo)

> "I bought a young milch cow and calf for twenty-four dollars . . . she gives a good supply of milk and cream . . . .
>
> "I have been occupied in getting as many acres as I can cleared and prepared for cropping. Sixteen are already under operation which will make a good open about the house. . . ."

(Radcliff then describes various methods of removing the trees which were burned to produce ashes, the first "crop" on a pioneer farm in Upper Canada. An acre of his hardwood produced about 60 bushels of ashes to be sold to the nearest ashery, where potash was made, for use in manufacturing glass, soap, etc.)

The early landscape and agriculture of Southern Ontario

1. What building materials did Thomas Radcliff use? If you happen to live in Southern Ontario, compare these with the building materials used in your neighborhood now.

2. (a) What uses did Radcliff make of wood?

(b) In what ways does his account suggest that the forest was a great problem to the pioneers?*

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*One reason why the forest disappeared so quickly in Southern Ontario was that settlers regarded it as an enemy. This was their attitude even though wood had high value for housebuilding, as a fuel for heating and cooking, and provided solid roadbeds as well as even road surfaces (the famous "corduroy roads"). The forest was also a source of fish and game and helped to protect settlements from the worst effects of the weather. Today, we are trying to restore some of the forests that the pioneers removed.

(c) Comment on the type and variety of trees found in the pioneer forest. Were they **deciduous** hardwoods that lose their leaves in winter, or **coniferous** softwoods (evergreens)?

3. What does this account suggest about the soils of Southern Ontario?

4. Describe Radcliff's early sources of income. What crop did he expect would eventually make him prosperous?

5. Study Figure 2—27 carefully and list all the features of this landscape and of pioneer life that are similar to those mentioned by Radcliff. Note especially the forest, the house, the cleared land, and the work being done by the two men. What animals are they using? Notice the stumps in the fields. Wheat and other crops were sown between these stumps which might take up one fourth of the land.

6. Study Figure 2—28.

(a) What is the most striking feature of this scene, compared with Figure 2—27?

(b) What other changes have taken place in the landscape in 30 years?

(c) Has this farmer prospered? Give reasons for your answer.

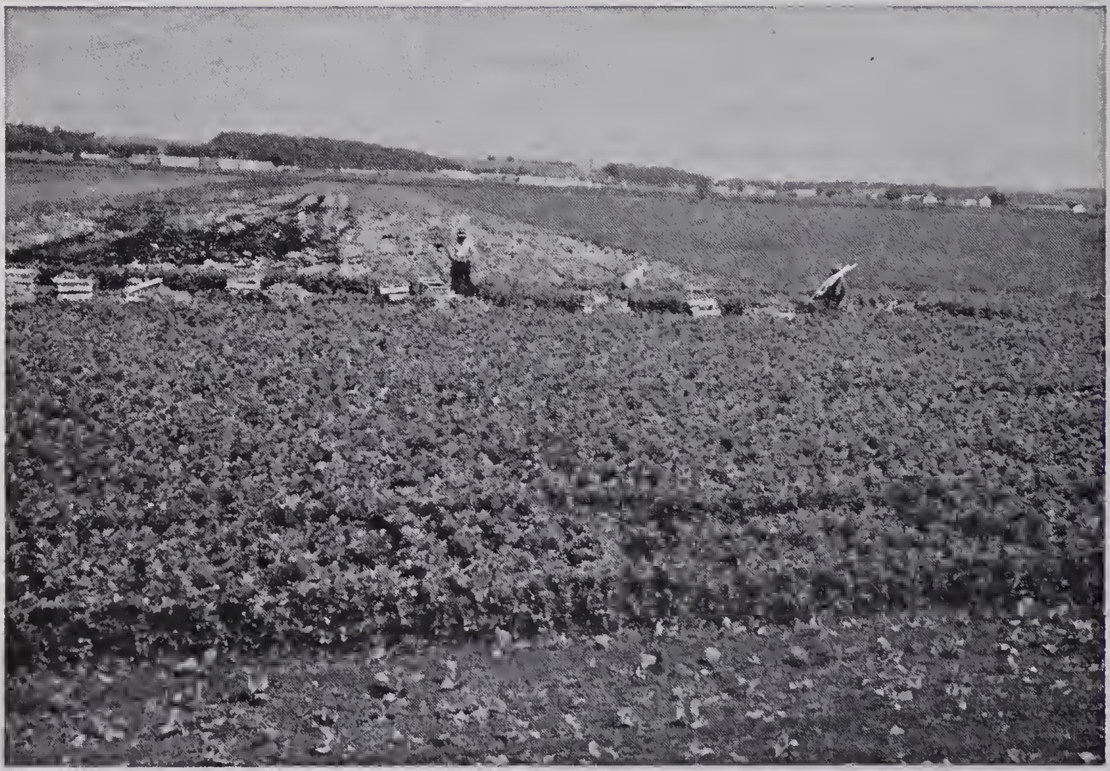
7. Figure 2—29 shows a scene in a rich farming district of south-central Ontario today.

(a) Describe the relief of the land.

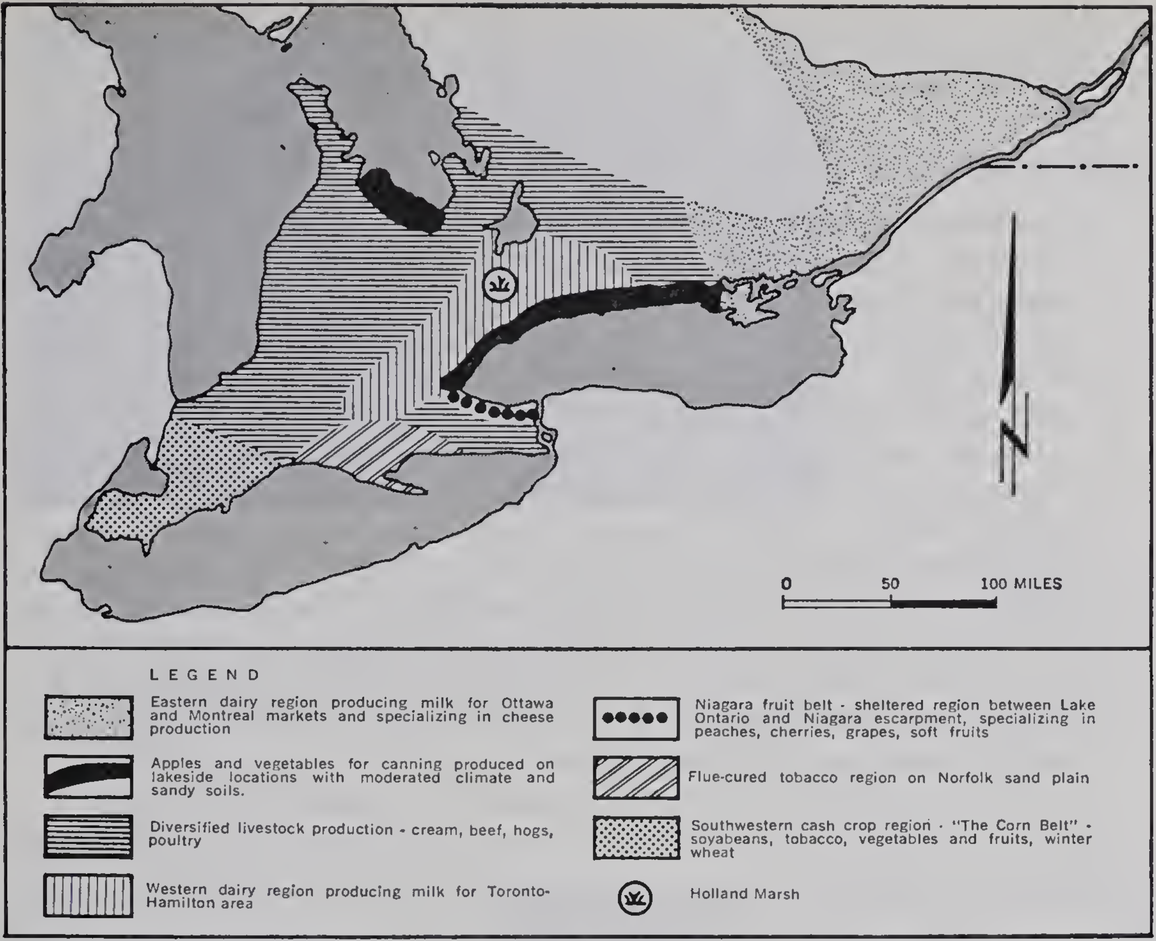
(b) What evidence is there that this is rich soil, similar to that described by Thomas Radcliff?

(c) In what ways has this landscape changed since 1832?

Clearing the land was a major problem in the days when a thick, mainly deciduous forest covered the region. Today, nearly all of the forest has disappeared. It is estimated that less than ten percent of the land of Southern Ontario is now wooded. Efforts at *reforesta-*



2—29 Harvesting celery in Holland Marsh (Ontario Agricultural College photo)


0 50 100 MILES
LEGEND
Eastern dairy region producing milk for Ottawa and Montreal markets and specializing in cheese production
Apples and vegetables for canning produced on lakeside locations with moderated climate and sandy soils.
Diversified livestock production - cream, beef, hogs, poultry
Western dairy region producing milk for Toronto-Hamilton area
Niagara fruit belt - sheltered region between Lake Ontario and Niagara escarpment, specializing in peaches, cherries, grapes, soft fruits
Flue-cured tobacco region on Norfolk sand plain
Southwestern cash crop region - "The Corn Belt" - soyabeans, tobacco, vegetables and fruits, winter wheat
Holland Marsh

2—30 Types of farming in Southern Ontario (after L. D. Chapman)

tion are being made. What problems might result from the clearing of the land? These problems will be discussed later in the chapter.

There are large areas of level land and fertile soils in Southern Ontario. In Radcliff's time, wheat was a major crop. Large quantities were exported to Europe, especially to Great Britain. This wheat trade encouraged the building of the early canals (such as the Welland and Lachine canals) and the establishment of the first railways in Canada. Later, when wheat growing developed on the Prairies, Southern Ontario farmers turned to the cultivation of fruit, vegetables, and pasture crops. However, much *winter wheat** is still grown in the southwestern corner of the province between London and Windsor.

Agriculture in South-Central Ontario

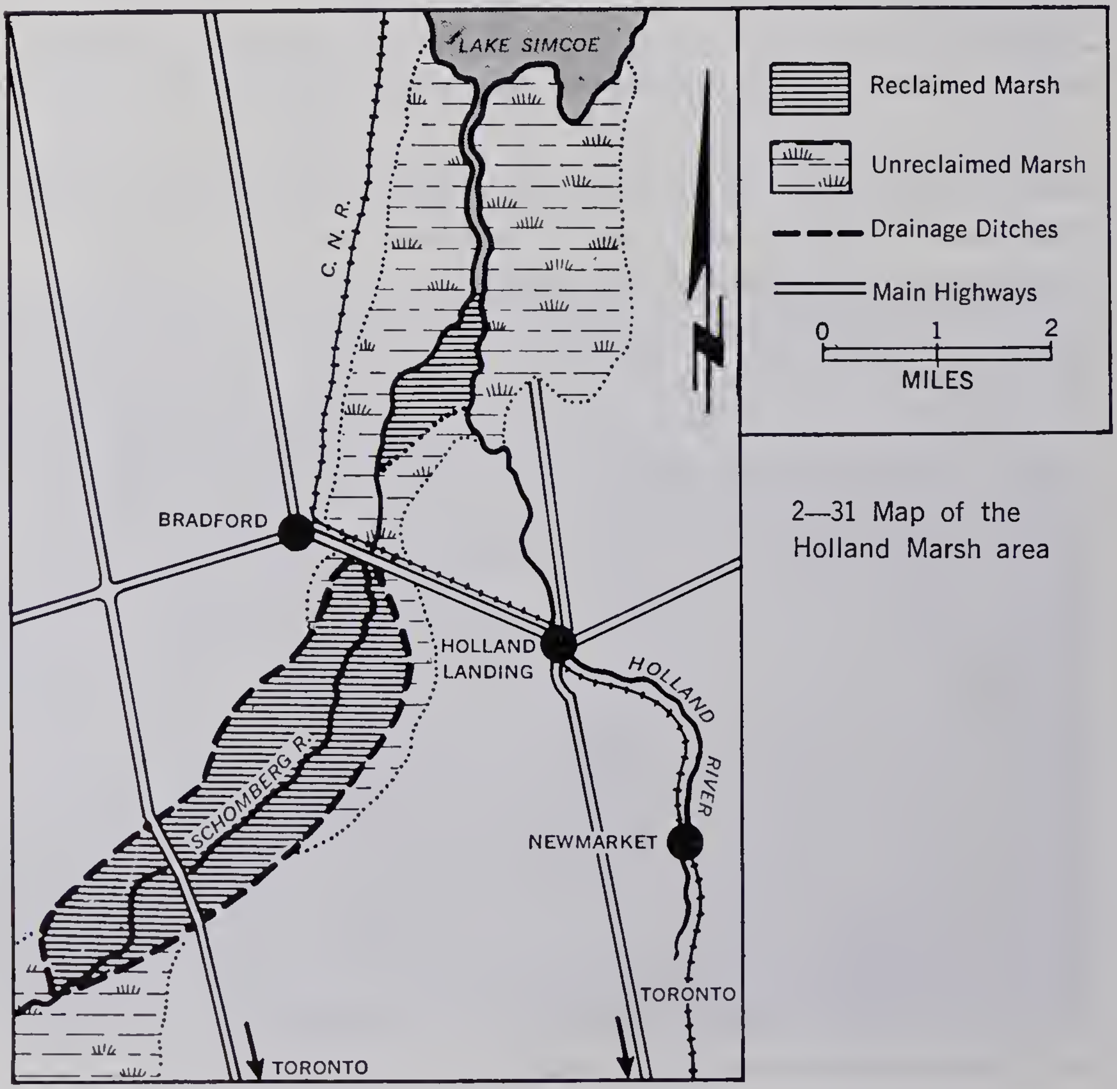
A study of the map in Figure 2-30 shows that several different kinds of farming are carried on in south-central Ontario. Describe the location of the fruit and vegetable belt. In some ways, this is a continuation of the Niagara Fruit Belt. Parts of two dairy belts are found in

*This is wheat that is sown in the autumn and harvested in summer. Winter temperatures are mild enough and there is sufficient snow cover in southwestern Ontario to enable such a crop to survive the long winter.

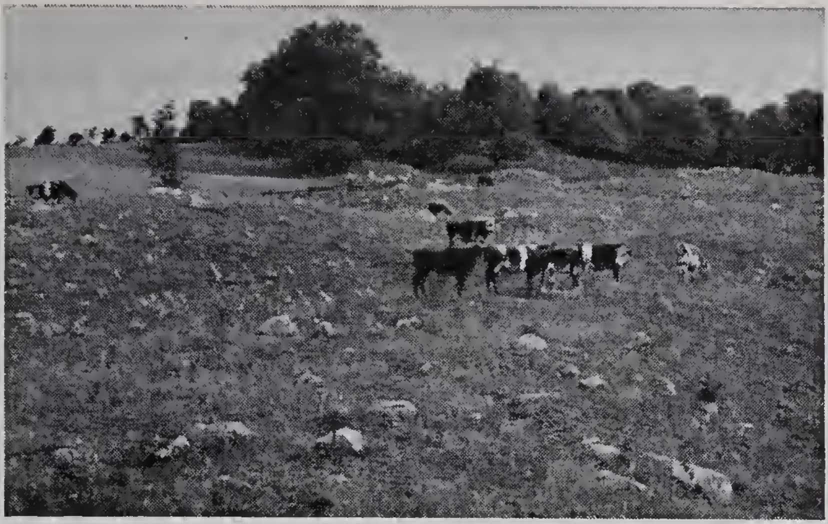
the region. According to the legend, what does "diversified livestock production" mean? Note the location of Holland Marsh.

Holland Marsh: an important agricultural district of Southern Ontario

1. (a) Name the two rivers that drain Holland Marsh, as shown in Figure 2—31. Into which body of water do they flow? The soil there is mostly peat, or black fertile muck, on which good crops can be raised.
(b) What system has been used to drain the marsh? Drainage began in 1920. In 1935, large numbers of Dutch farmers settled there. Today, there are also farmers from Italy, Germany, and Japan.
(c) Name three important towns in the region. Of these, Bradford is the most important to the farmers of Holland Marsh. About how far is Bradford from Toronto? Why is it easy to transport the products of the marsh to market? Trucks carry fresh vegetables to Toronto daily during the season. Refrigerated railway cars carry them as far west as Winnipeg and as far east as Halifax. List some occupations that you would expect the people of Bradford to follow.
(d) At present, about 7000 acres of Holland Marsh have been drained. It is believed that about 5000 more acres can be reclaimed. In which areas on the map are these future farmlands found?
(e) Why are Dutch farmers especially valuable immigrants to this area?



2—31 Map of the Holland Marsh area



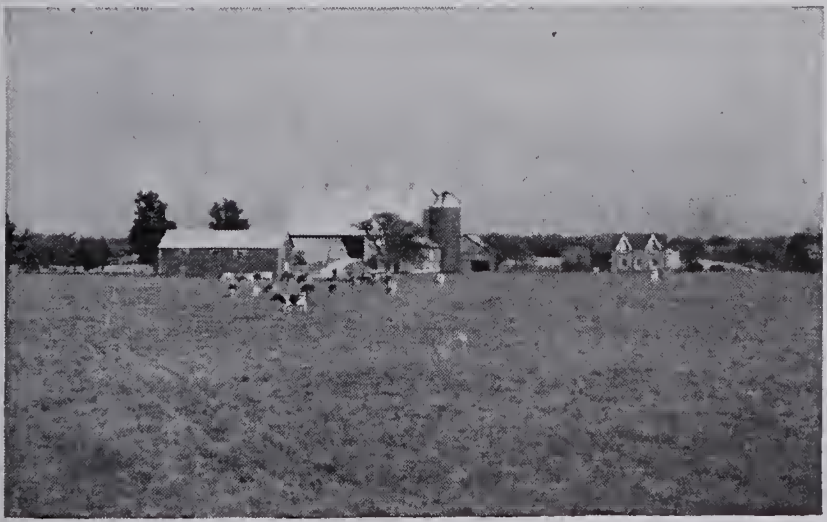
2—32 Dairy cattle grazing on a moraine in Southern Ontario (Ontario Agricultural College photo)

2. Study Figure 2—29 again. Which features of the drained marshland can be located in this picture? What crop is growing in the foreground? Other vegetables grown in the Marsh include onions, lettuce, carrots, beets, celery, beans, and peas. Raising such crops requires much hand labor in fairly small fields. This work is called "market gardening." What are the people in the photograph doing?

Each type of farming carried on in Southern Ontario is related to local factors of climate, soil, and relief. The flat, fertile land of Holland Marsh has proved very favorable for raising vegetables. Figure 2-32 shows another type of land very common in Southern Ontario. The stony pasture in the foreground is called *moraine.* The stones were deposited by ice that covered this area thousands of years ago. Besides large stones, there are gravels and other materials at or near the surface of this rough land. How is this land being used?

Figure 2-33 shows another scene in the western dairy belt. There is much slightly rolling land like this in south-central Ontario. What indication is there that this is a very prosperous farm? Notice the large barn, with a tall *silo* at one end. How are these buildings used?

To the north of the area just illustrated mixed farming is the rule. One special crop area is found along the shores of Georgian Bay, east



2—33 A prosperous farm in the western dairy belt of Southern Ontario (Ontario Agricultural College photo) of Owen Sound. This is one of the main apple-growing districts of Southern Ontario, as shown in Figure 2-30. Still farther east is the Muskoka Lakes region, a beautiful area that serves as a summer playground for the people of Toronto and other cities of south-central Ontario.

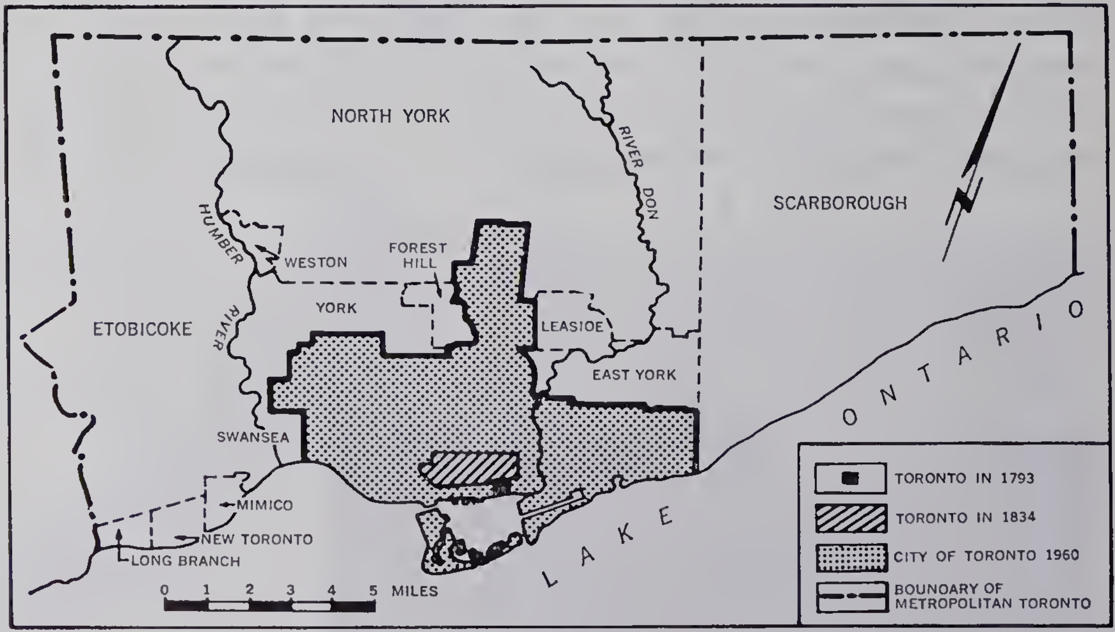
The eastern dairy region includes the largest cheese-producing area in Canada. Part of this area is located in south-central Ontario, as shown in Figure 2-30.

What conclusion do you draw about the different types of farming and the type of relief, climate, and soil in each area?

Metropolitan Toronto

What does Figure 2-34 show about the growth of Toronto? The total shaded area shows the limits of the city of Toronto proper today. However, Toronto is a name usually applied to a much larger area called "Metropolitan Toronto." Estimate the number of square miles covered by Metropolitan Toronto. How many townships make up Metropolitan Toronto?

According to the 1961 census, the city of Toronto contained 672,407 people, while Metropolitan Toronto contained 1,824,481 people. As such, it is Canada's second largest urban centre and one of the largest and fastest-growing cities in North America. More than one quarter of the population of Ontario lives in Metropolitan Toronto. Expressed another way, nearly ten percent of the people of Canada live in this



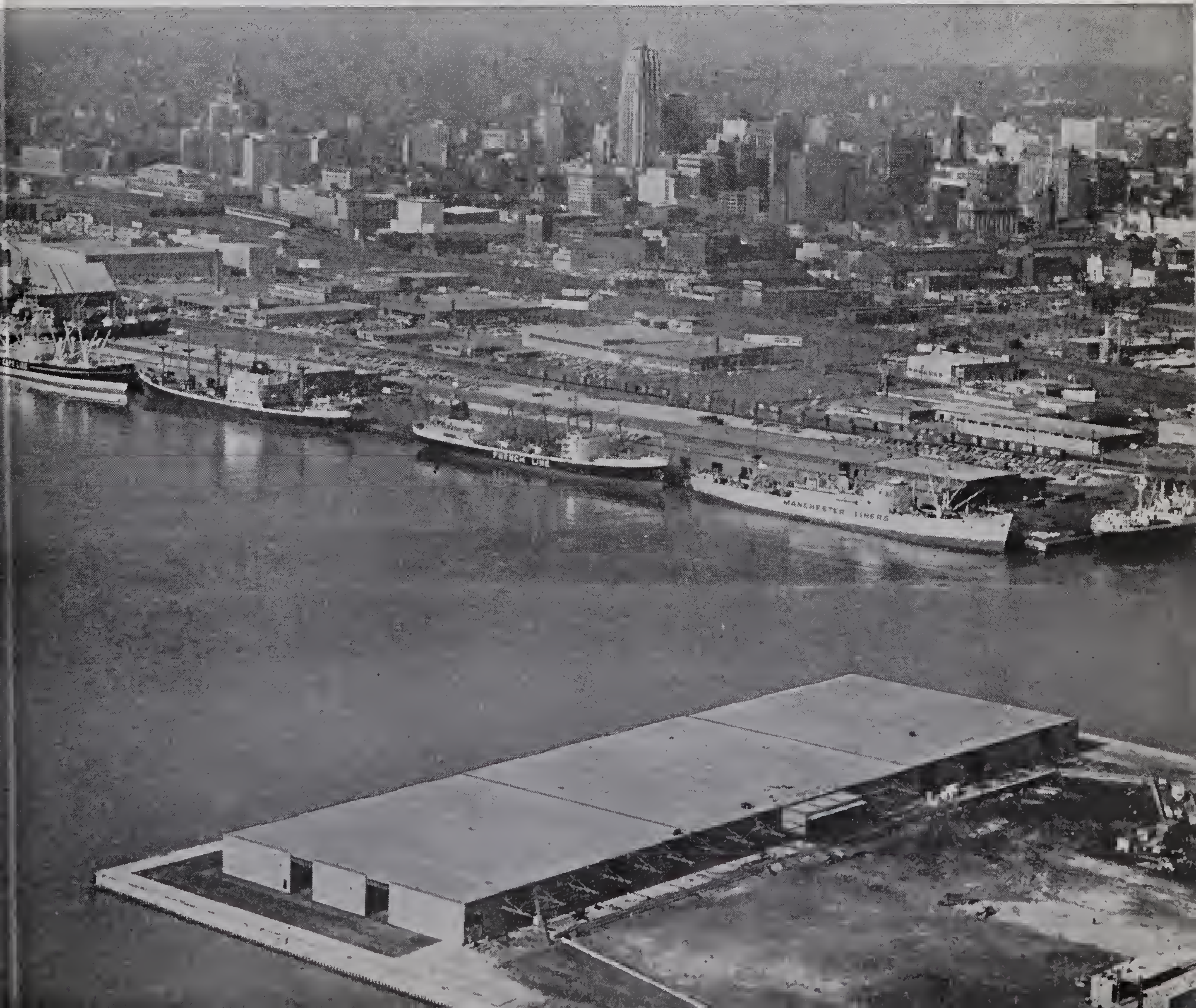
2—34 The growth of Toronto and the metropolitan area. Toronto 1834 does not touch the waterfront on this map because the shoreline has extended since that time.

area. Why has Toronto, among the many towns and cities of Ontario, grown to be by far the largest? An answer to this question may also help to answer the questions on page 18.

Even long before "little muddy York" was built in 1793, Toronto was a centre of Indian trade. The name means "a place of meeting." Toronto was at the end of a trail that led from the east bank of the Humber River to Lake Simcoe and thence to Georgian Bay. The site was probably first visited by white men in 1615. Between 1751 and 1759, a French fur trading post existed here.

In 1787, the British government purchased some land from the Indians and surveyed a townsite. A garrison was established there six years later. In 1794, York was settled at a point near the mouth of the Don River. Later, it became the capital of Upper Canada. When it was incorporated as a city in 1834, the name became Toronto. By 1900, it was an important port and railway centre.

2—35 Part of the port and downtown area of Toronto (Toronto Harbor Commission photo)



The Port of Toronto today

1. Figure 2—35 shows a view of part of the port and downtown area of Toronto today.
(a) The ships are berthed at the Queen Elizabeth docks. Locate these docks on the map in Figure 2—36. Marine terminals 15 and 17 are shown in the photograph. What evidence is there that these are overseas terminals? There are eight berths, each 500 feet long, to service overseas vessels in Toronto Harbor. In the foreground of the picture is a new marine terminal that was under construction in 1961.
(b) Toronto Harbor has 34 miles of railways. What evidence of these can be seen in the photograph?
(c) What uses are made of the tall buildings downtown? Describe the relief of the land in the far distance. This is part of the bed of old Lake Iroquois that also forms part of the site of Hamilton.
2. Study the large-scale map in Figure 2—36.
(a) What distance must a ship travel from the entrance to the western channel to reach Marine Terminal 17?
(b) Estimate the area of the water surface of Toronto Harbor. In what way does it resemble Hamilton Harbor?
(c) List reasons why this is a good site for a port.
(d) Which channel would a ship use to enter the port if it came from Montreal? From Hamilton?
(e) What is the depth of the deepest channel in the port? Elsewhere, depths range to a minimum of 12 feet. How can you tell that the deepest channels and the entrance channels have been improved?
(f) What evidence is there that much of the waterfront land has been reclaimed or formed by "dump fill"? Much of the fill material used recently came from the excavations made during the building of the Toronto subway.
(g) From a study of the map, make a careful list of some of the goods handled by the port of Toronto. Figure 2—37 shows some of these goods. Two large scrap metal yards have been established at Toronto Harbor since the opening of the St. Lawrence Seaway in 1959. Large quantities of scrap are shipped overseas. Suggest possible sources of this scrap. How is it being loaded on to the vessel?
(h) Make a list of some industries found in the city of Toronto. What imported raw materials are used by these industries? Where were these raw materials obtained?
(i) What use do the people of Toronto make of the islands that surround the port?*
(j) How does one reach the airport from downtown Toronto? The international airport serving the city is located at Malton, to the west.

Altogether, the Port of Toronto contains 12 miles of docks. In addition to eight overseas berths, there are 60 domestic berths, each capable of handling vessels up to 600 feet in length. The fact that there are so many more domestic berths than overseas berths emphasizes the fact that most of the trade of the port consists of raw materials and finished goods originating within Canada and other parts of

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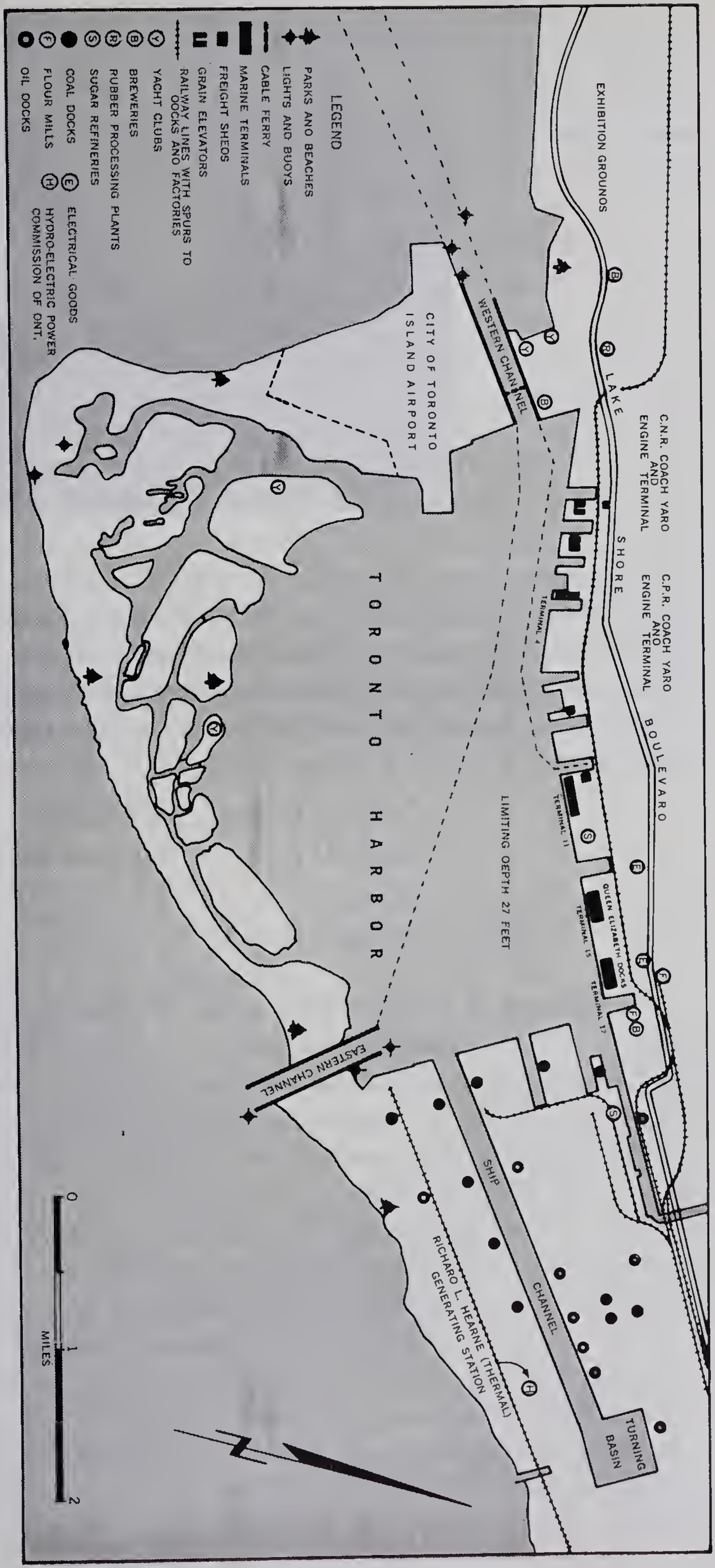
*Toronto Island is the largest of these and was once a great "sand spit" extending into Lake Ontario. It has gradually been built up as westward-flowing lake currents have carried and deposited material from the Scarborough Bluffs to the east.



2—36 Large-scale map of Port of Toronto

2—37 Scrap iron and steel being loaded for export at Toronto Harbor (Port of Toronto Authority photo)

North America. Most raw materials come from within Canada or the United States. Most finished goods handled are produced in Metropolitan Toronto or in other parts of Southern Ontario.

The opening of the St. Lawrence Seaway has had great influence on the port. It has resulted in a big increase in overseas trade, as these figures show:

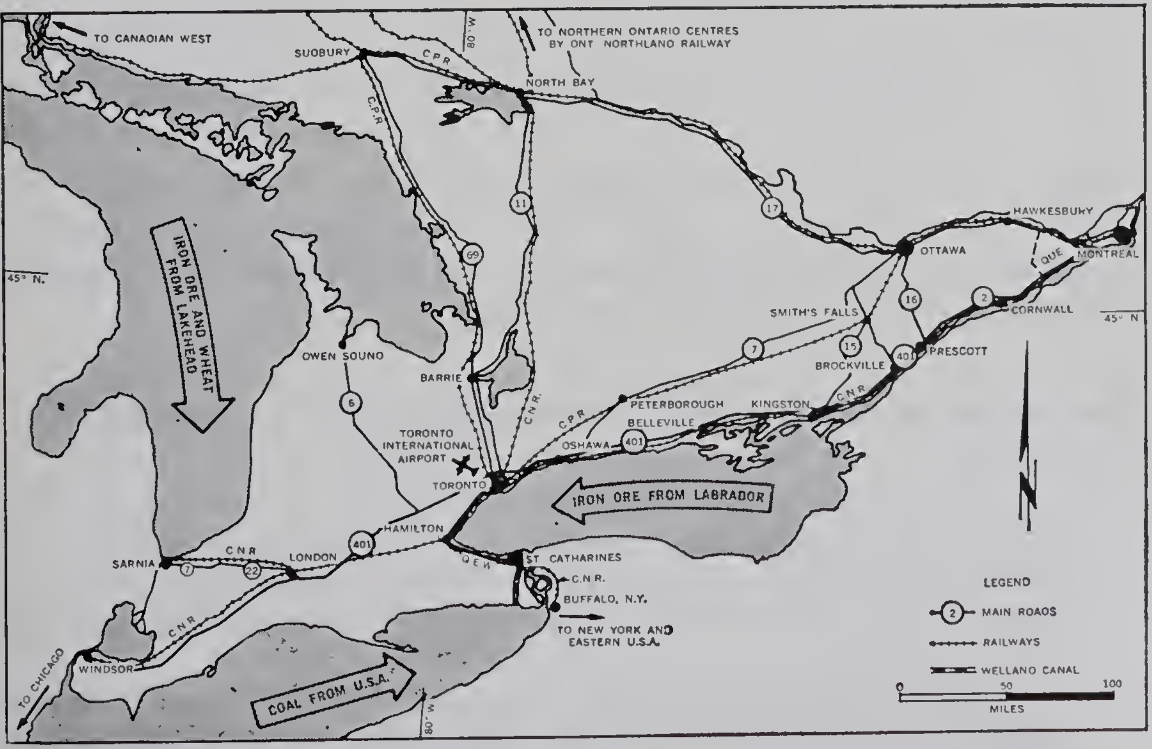
	Overseas tonnage handled	Nationalities of ships calling at the port
1958	288,000	11
1960	762,000	21

Only Chicago, of all Great Lakes ports, handles more overseas cargo. Tonnage in 1960 was about two and one half times that of 1958. The new 27-foot Seaway channel has enabled larger ships to reach Toronto. Costs of moving many cargoes directly to the port have been lowered, leading to the establishment of new industries. The best example of this is a large sugar refinery built recently in Toronto. This was possible because, for the first time, Toronto has been able to import sugar directly from Cuba and the West Indies. Since goods can be shipped directly to Europe without having to be transferred (as in the past) to ocean-going vessels at Montreal, export shipping costs have been reduced. This is a major reason why Toronto's exports of scrap metal have become so important.

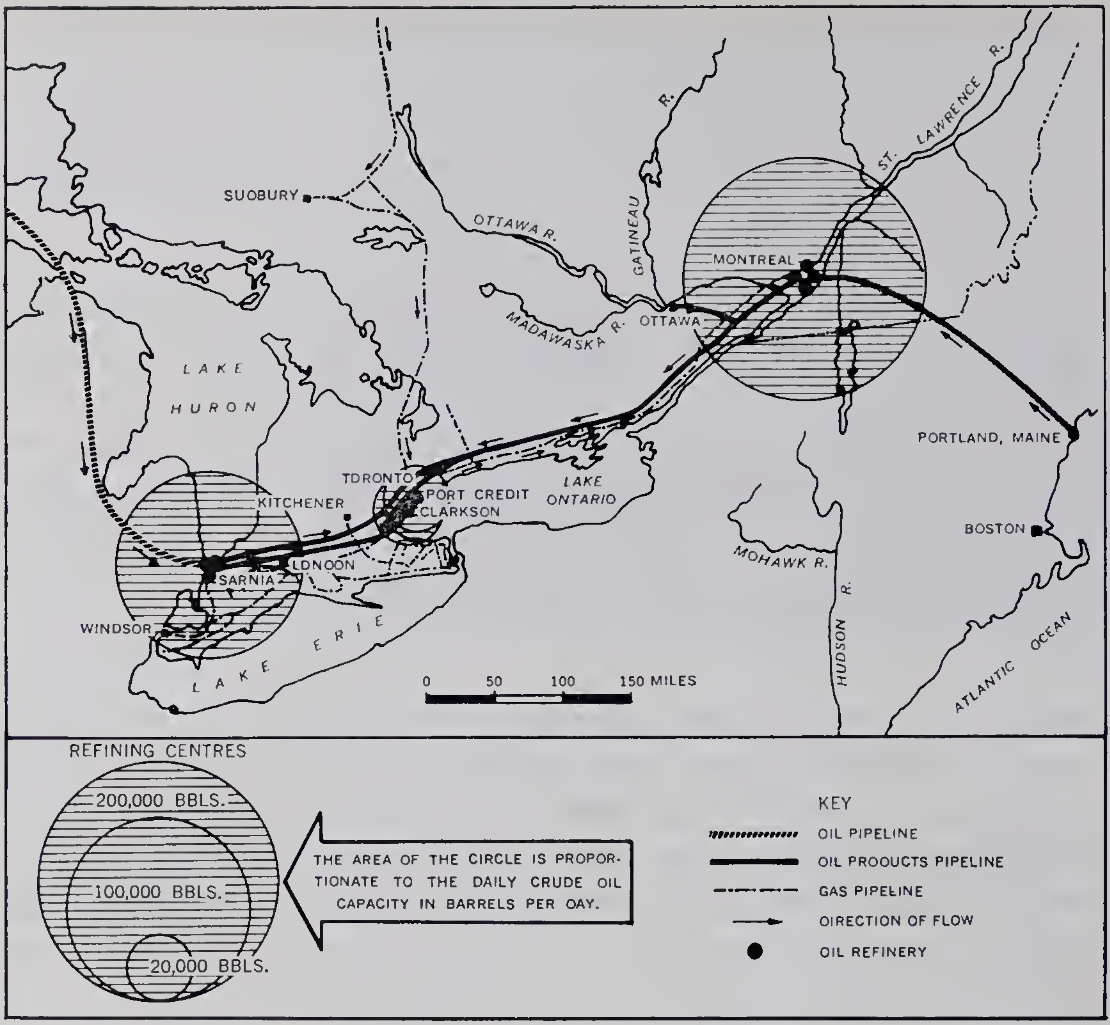
In 1960, the first overseas vessel reached Toronto on April 21st. The last one left on November 29th. The domestic shipping season lasted from March 19th to December 22nd. Why is the domestic season longer than the overseas season? During 1960, 2261 outbound vessels passed through the port.

In addition to facilities mentioned, there are nine grain elevators with a total storage capacity of 9,500,000 bushels. A large cold storage plant and important facilities for supplying vessels with coal and oil are also located there.

Very few of the raw materials needed for its industries are available within Toronto itself. However, there are abundant building materials – mainly limestone and sandstone – formed from the deposits of ancient lakes and seas that once covered the present site of Toronto. The fact that it has an excellent harbor and a good location on Lake Ontario have been the major reasons for the growth of the city. Both the large Canadian railways serve Toronto. The city is a focus of rail and road routes. This is shown clearly in Figure 2-38. Note especially how railway lines "fan out" from the city, like the spokes of a wheel. The fact that there are no railway routes passing through Toronto has been another reason for the city's growth. Thus, a shipment of freight from Montreal to London, Ontario, must be *trans-shipped* (transferred from one railway line to another) at Toronto. This has helped to make the city the major distributing centre for the whole of Southern Ontario. Goods reaching the port must also be distributed in the same way.



2—38 Toronto as the focus of routes in Southern Ontario. Note also the central position of London in the southwest.

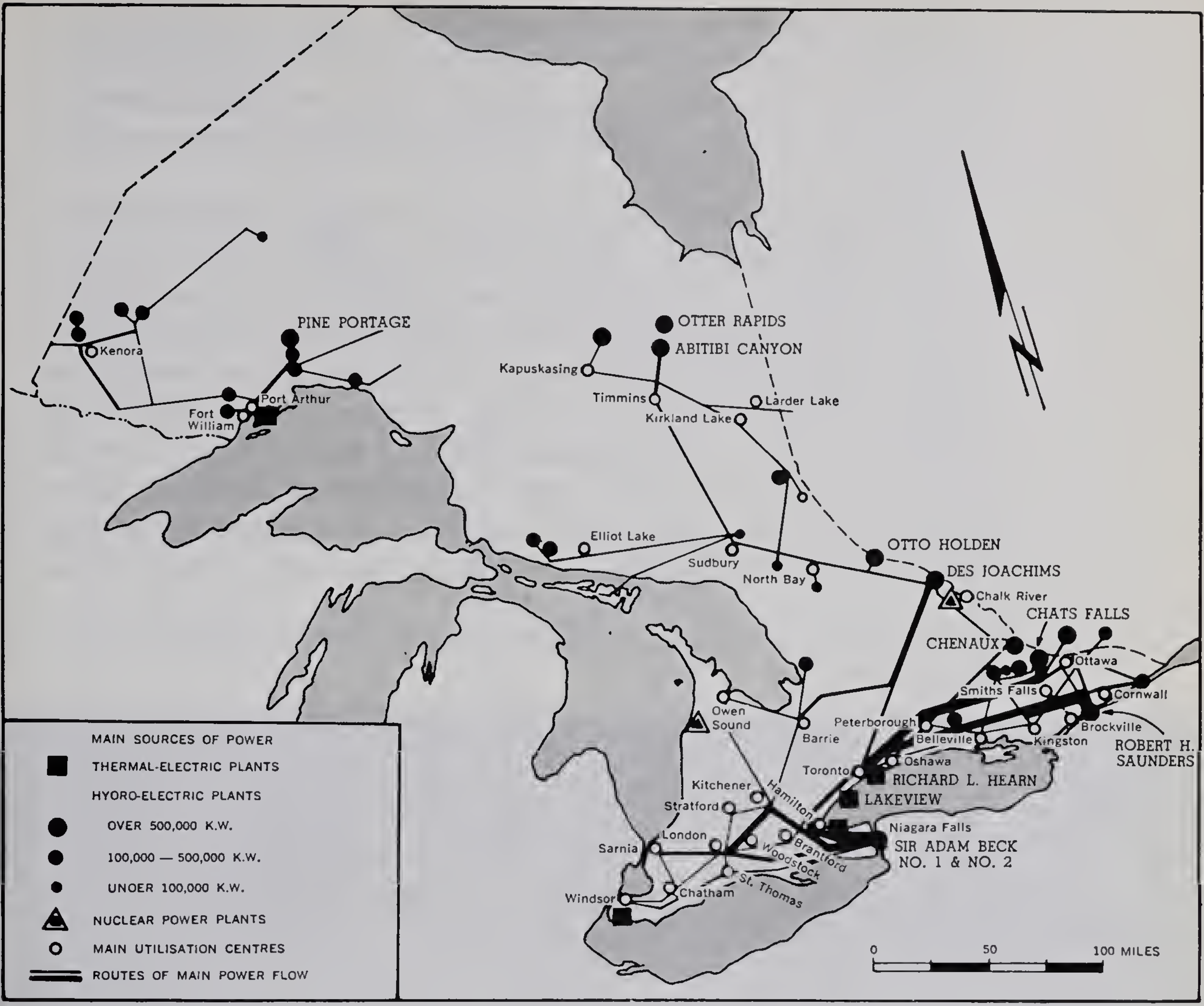


2—39 Oil and gas pipelines and oil refineries in Southern Ontario and Quebec

A great modern industrial city must have sources of power and energy. Many different sources are available to Metropolitan Toronto. Locate the oil pipeline in Figure 2-39. Where are the major oil refineries of the Toronto region located, according to this map? Most of the oil used here comes from Alberta. On Figure 8-24, page 351, trace the route of the pipelines that carry oil across Canada to Toronto. What other fuel reaches Toronto from the same region?

What sources of electric power are available to Southern Ontario? (Figure 2-40)

1. (a) What are the sources of Toronto's electricity?
(b) Which rivers supply most of the hydro-electric power?
(c) What other province supplies power to Southern Ontario?
(d) How important is power from Niagara Falls in comparison with that from Eastern Ontario?
2. The Ontario Hydro-electric Power Commission operates two great **thermal electric power plants** in the Toronto region. Even though vast amounts of hydro-electric power are fed to Toronto, it has also been necessary to build thermal plants. A view of the new Lakeview power station, appears in Figure



2—40 Power network of the Ontario Hydro-Electric Power Commission

2—41. As you study this photograph, refer also to the location of this power plant in Figure 2—40.*

(a) Compare this photograph with the view of the power stations in Figure 2—26. How can a thermal power plant be distinguished from a hydro-electric power plant?

(b) Describe the location of the Lakeview thermal plant. Which body of water appears in the photograph?

(c) Give reasons why the site of the Lakeview power plant is well chosen.

(d) What kind of fuel is used in this plant? Where does the fuel appear in the photograph? Where does this fuel probably come from? Describe the vessel that transports the fuel to the power site. One conveyor for moving the fuel to the stockpile is shown. A second conveyor was under construction in 1962.

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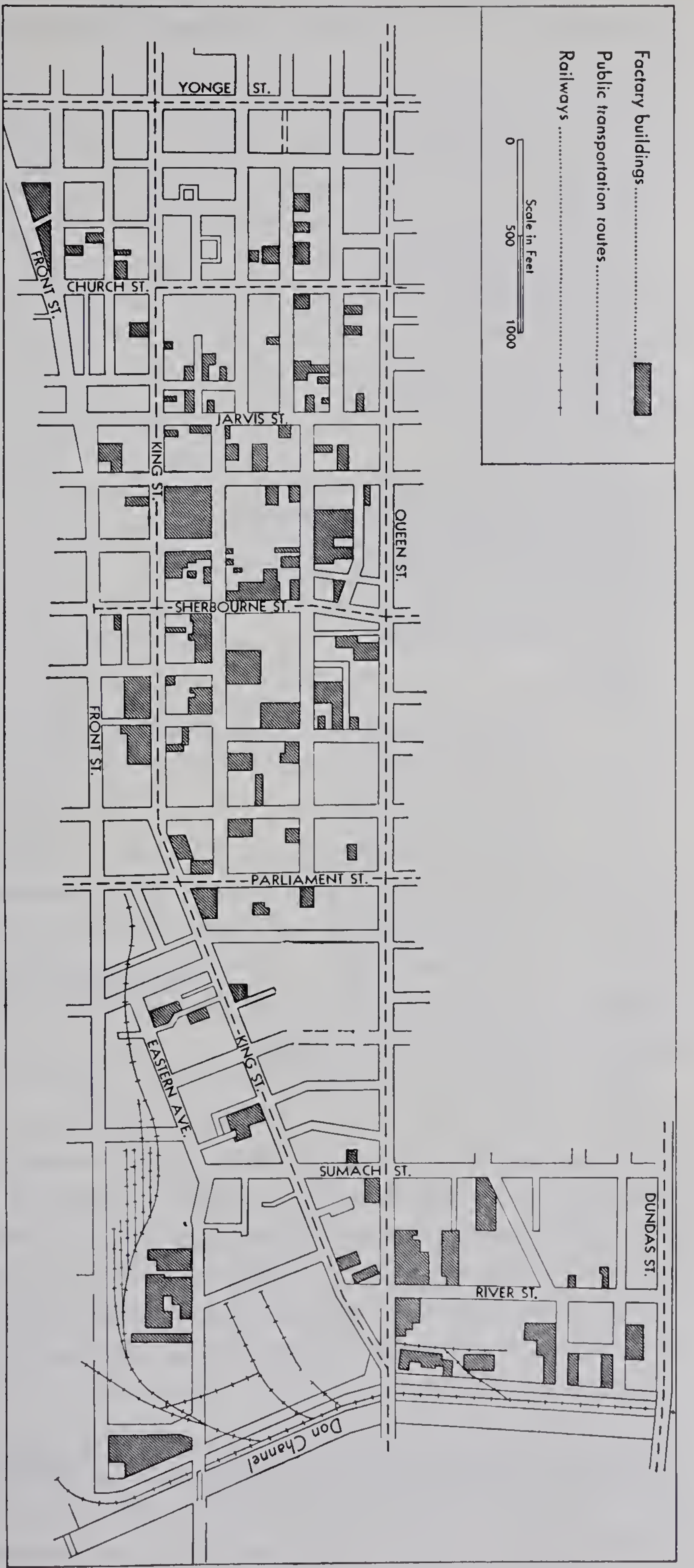
*In a hydro-electricity plant, power is generated by the force of moving water that turns great machines called turbines. As these turbines rotate, electricity is produced by generators attached to them. A thermal electric power plant produces electricity in the same way, with one important difference. Steam power is used to rotate the turbines and generators. This steam is produced by burning coal or other fuels.

The first unit of the Lakeview plant was completed in 1961 and is the largest of its kind ever installed in Canada. When completed, there will be six such units, producing together nearly 80 percent as much power as that produced at the Barnhart powerhouse near Cornwall.

A city as large as Toronto requires vast quantities of electric power. Make a list of the uses to which such electricity is put. Toronto's industries consume the greatest amount. This is easy to understand when it is realized that metropolitan Toronto has nearly 5000 factories, which employ nearly 250,000 people and produce almost one fifth of Canada's manufactured goods. Many of them are concentrated in downtown Toronto, near the port. Figure 2-42 is a map of a small part of the downtown district. What is the approximate length of the area shown on the map? There are no factory buildings in the Don River Valley. What purpose is served by this valley? Many of the

2—41 The Lakeview thermal power station, Toronto (Ontario Hydro-Electric Power Commission photo)

2—42 Distribution of industry in an area of downtown Toronto



factory buildings contain more than one business. In a study of 152 industrial firms located in the map area, the following information was obtained:[*]

Type of Manufacturing	No. of Firms	Total Persons Employed
Printing	35	1515
Industrial Machinery	10	839
Castings, metal patterns	6	534
Food Processing	12	483
Electrical Appliances	4	331
Jewellery	13	325
Shoes, leather products	6	316
Home furniture, etc.	11	290
Clothing, textiles	5	297
Tool-die, metal stamping	8	181
Hospital equipment, medical supplies	4	155
Building materials and supplies	5	155
Ornamental and industrial plating	4	100
Paper boxes, containers	3	84
Waxes, soaps, detergents	3	29
Others	23	1088
TOTAL	152	6722

2—43 Types of Manufacturing in a section of Downtown Toronto, 1956

This table indicates the great variety of industries in Toronto. The size of the various factories is shown by the number of employees in each. It was found that 113 of these factories were small, employing less than 50 workers each. It has been estimated that 4700 factories employ an average of only 43 workers each. In only 173 factories are more than 200 workers employed.

Some industries are moving from the centres of our cities to the suburbs, but in the study of 152 downtown firms, it was found that three quarters of them intend to remain in the area because the central location has so many advantages. What are some of these advantages? Many of the buildings in the district are old and can be rented at very low cost. Note the railway facilities available in Figure 2-42. Why would the presence of good *public transportation*[**] facilities be an advantage to a factory? Frequent pick-up and delivery services by truck are an advantage.

[*] This and the following material on manufacturing in suburban Toronto are based on studies by Professors D. Kerr and J. Spelt, published by the Geographical Branch, Department of Mines and Technical Surveys, Ottawa.

[**] Public transportation refers to passenger facilities such as buses and subways.

Some factories are located in the downtown area because most of their customers are nearby. Thus, many printing and publishing firms do work for businesses located in the area. Materials, spare parts, and other goods needed by manufacturers are easily obtained downtown. Labor is also easily available. Many immigrants look for their first jobs in the factories shown on the map. About one fourth of the employees in these 152 firms are women. Which types of manufacturing employ the largest percentage of women?

Of the firms that intend to leave the area shown on the map, many are moving to other parts of downtown Toronto. Only some are going to the suburbs. Old, unsuitable buildings are a major reason why some factories intend to leave. In many cases, they must expand, and need more space than they have at present.

A study of 182 factories in four suburban areas outside the city of Toronto again shows the great variety of manufacturing in the metropolitan region. Factories studied in the four areas of Scarborough, North York, Rexdale, and Etobicoke were engaged in the following types of manufacturing in 1958:

Transportation (Aircraft and Automotive)
Electrical Appliances
Containers, Packaging Materials
Industrial Machinery
Building Supplies
Aluminum Screens and Doors
Food Processing
Printing
Electrical Apparatus and Supplies
Paints and Varnishes
Tool and Die Making
Office Machinery, Equipment
Textiles and Clothing
Furniture
Soaps and Cosmetics
Metal Castings
Plating
Toys

2—44 Types of manufacturing carried on in 182 factories in four areas of suburban Toronto, 1958

Most of the factories making the goods listed above have been established since 1950. Most are medium-sized, one-storey brick buildings, located 100 feet from the road, with well-landscaped lawns. Many reasons were given by owners for locating in particular areas. In some cases, the fact that most of a plant's skilled workers were concentrated in a certain area was an important reason for location in that area. Suburban housewives are often anxious to obtain jobs near their homes; they are an important source of workers for the industries studied. Some factories were located near the owners' areas of residence. Cheap land is an important reason for some factories having moved from downtown to the suburbs. Many modern industries favor single-storey plants covering huge, open floor areas in which people and materials can be easily moved. In a few cases, factories have been located in suburban areas along major highways for advertising purposes. Manufacturers of awnings and screens are greatly influenced by this factor. As many as 200,000 people per day may see a factory sign located on a busy route such as Highway 401, which passes through Metropolitan Toronto.

Of the industries listed in Figures 2-43 and 2-44, the most important are those engaged in food processing, which includes such industries as canning fruit and manufacturing cereals. Make a study of the foods in your home. Which ones were manufactured in Metropolitan Toronto? Most Canadian books and periodicals published in English are produced in Toronto. No part of Canada manufactures more electrical goods, metal products, and machinery (especially farm machinery). The manufacture of aircraft is also important. Flour milling and oil refining are major industries shown in Figure 2-36.

In 1956, Toronto became the first city in Canada to adopt full metropolitan form of government. The 13 municipalities shown in Figure 2-34 were united under a single government. However, each continues to elect its own mayor and council and to supervise certain activities, such as education. The Metro (as it is called) looks after most parks, the water supply, sewage disposal, roads, highways, and other services.*

Transportation is one of the most difficult problems in this area. South-central Ontario and the "Golden Horseshoe" have developed the most extensive system of modern highways in Canada. Figure 2-45 shows an interchange on the Queen Elizabeth Way. What are the advantages of this type of intersection? Why does the building of modern super-highways cause further losses of valuable farmland? How is this evident in the photograph?

The Toronto Metro began the construction of Canada's first subway in 1949. Although only 4½ miles long, it is part of a system that will eventually extend many more miles. Workers can take buses or drive their cars to outlying stations, and then ride into downtown Toronto on the subway. How does such a system help to reduce traffic problems? In March, 1963, another section of this subway was put into operation; the next major stretch should be completed in three or four years.

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*The Metropolitan Toronto and Region Conservation Authority, formed in 1957, had, by 1962, developed nearly 5000 acres of land as conservation areas. These recreation lands or "green belts," located mainly in the Don and Humber valleys, will greatly benefit the people of Toronto. Reforestation, prevention of stream pollution, and other activities may repair some of the damage that man has done to the landscape in the past.

2—45 An interchange on the Queen Elizabeth Way near Oakville (Ontario Department of Highways photo)

Toronto serves as the capital of Ontario. The University of Toronto is the largest in Canada and is internationally famous for its many fine schools and research laboratories. Most national television and radio programs in English originate in Toronto, and through this industry, the city influences every part of Canada. Art galleries, music conservatories, museums, and theatres help to make Toronto a leading centre of North American culture.

Half of all immigrants to Canada settle in Ontario. Most of these find their jobs and make their homes in Metropolitan Toronto. People of every color, race, language, and creed may be seen on the city streets. They help to make Toronto one of Canada's most interesting cities.

What answers has this study of Toronto provided to the questions on pages 18 and 57?

Other Cities of South-Central Ontario

In 1876, Robert McLaughlin, a carriage-maker by trade, settled in Oshawa. By 1918, McLaughlin's carriage factory was manufacturing automobiles. In that year, the company became incorporated with General Motors Corporation. Today the great General Motors factory employs 15,000 people, more than all other manufacturing establishments combined. The city is one of Canada's three great centres for the manufacture of automobiles. Refer to Figure 2-2 and state in which direction Oshawa lies from Toronto. How many miles is it from downtown Toronto?

Oshawa has a good harbor on Lake Ontario. Coal and oil for local use and distribution are the main imports. Major railways and high-

2—46 Concentrated iron ore pellets being transported by rail from the concentrator at Marmora to the harbor of Picton (Canadian National Railways photo)

ways serve the city. Besides automobiles, a great variety of iron and steel products are made. Although Oshawa has many advantages as a centre for automobile manufacturing, several other places in Ontario and Southern Quebec probably have equal advantages. Its importance as an automobile centre is a good example of how accidental factors or individual choice can influence the growth of a place. Robert McLaughlin's personal decision to establish his carriage business there was largely responsible for the great automobile industry that exists in Oshawa today. It is now a city of 60,000 people, one of the larger centres of Southern Ontario.

Peterborough is another large centre of South-central Ontario. As Oshawa is famous for its automobiles, so Peterborough boats and outboard motors are famous among sportsmen across Canada. The city dates from 1825, when Peter Robinson (after whom the city is named) brought in 2000 Irish settlers. They began to farm the *drumlins** in country that in appearance is similar to, although rougher than, that shown in Figure 2-47. Peterborough is now a city of 60,000 people.

General farming is usual now in the Peterborough region, with emphasis on dairy and beef cattle and on pasture crops. The city is no longer important as a lumbering centre. Today, besides the manufacture of canoes and outboard motors, Peterborough factories make food products, electrical appliances, and other goods. North of the city lie the Kawartha Lakes, a major resort area of Southern Ontario.

Locate Marmora on an atlas map. Where does it lie in relation to Peterborough? Here is the only major metal ore deposit in Southern Ontario. Iron ore from large mines is sent to Great Lakes steel mills via the small port of Picton, east of Kingston. Figure 2-46 shows concentrated ore in the form of pellets being hauled to Picton Harbor, on Lake Ontario. Concentrating is done by crushing the ore-bearing rock to remove waste. The pellets contain a much higher percentage of iron than the crude ore. How does concentrating help to lower the costs of transporting the ore?

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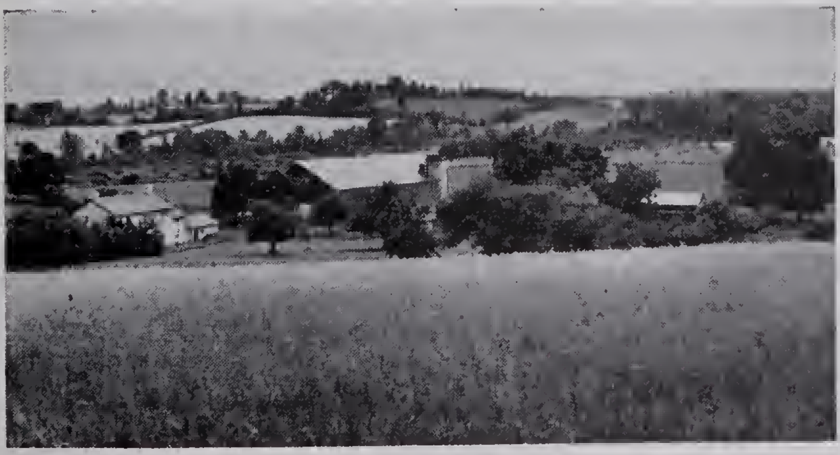
*For an account of the glacial features called drumlins, see page 71.

Other important cities of South-Central Ontario include Orillia, Belleville, Barrie, and Oakville. Where is Belleville located? On what body of water are Barrie and Orillia? These cities manufacture the variety of goods found in most industrial centres of Southern Ontario. Where does Oakville lie in relation to Toronto? Located near the centre of the "Golden Horseshoe," this city is noted for the manufacture of Ford cars and trucks.

SOUTHWESTERN ONTARIO

This part of Southern Ontario is shown on the map in Figure 2-2. It has very distinct boundaries. What are they? The agricultural map in Figure 2-30 shows that Southwestern Ontario is an area of varied agriculture. The Western Dairy Belt, serving the Toronto-Hamilton Region, begins there. To the north lies a livestock belt where poultry, hogs, sheep, and beef cattle are raised. Southwest of Hamilton is Canada's chief tobacco region. In the extreme southwest, between London and Windsor, is the chief area of varied cash crops in Canada.

The Western Dairy Belt is centred around the cities of Guelph, Waterloo, and Kitchener. Much of the countryside is rolling or consists of many low hills, such as those shown in Figure 2-47. This photograph was taken between Guelph and Kitchener. The hills are called *drumlins*. They are long, low, cigar-shaped hills, looking sometimes like upturned canoes. They consist of gravels, sand, and other materials deposited by glaciers. There are thousands of drumlins in Southern Ontario. If carefully used, the soils of drumlin areas are very productive. What uses are made of the land shown in Figure 2-47? Dairy products are a major source of farm income in this area. The light, sandy soils of the district yield good fodder crops as long as erosion on the slopes is carefully controlled.



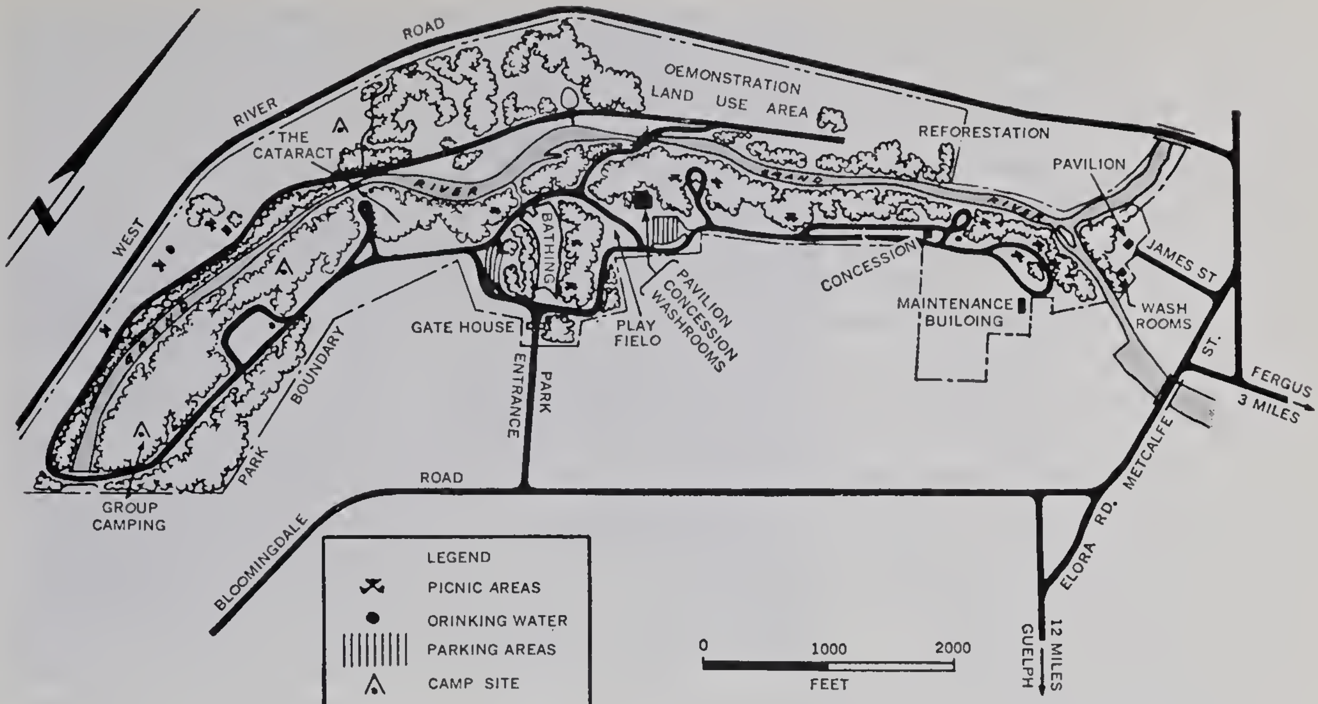
2—47 Fertile farmland between Guelph and Kitchener (Canadian National Railways photo)

Much of this area is drained by the Grand River. Where does this river have its outlet, according to Figure 2-2? The Grand River Valley illustrates the modern approach to conservation. In 1948, the people of 70 towns and cities in the valley organized the Grand River Conservation Authority. This agency has been responsible for the reforestation of large areas where lack of trees was causing serious erosion. During the period 1953-58, about 750,000 trees were planted. Farm ponds have been constructed, dams built to control floods, and steps taken to reduce pollution in lakes and streams. Each angling club has been invited to improve one mile of stream as a fish habitat over a period of three years. Prizes are offered for the best work. Hunters' clubs have been invited to take similar measures to preserve game.

Nowadays, we realize that recreation areas are a natural resource. Figure 2-48 shows a map of Elora Gorge Park, north of Kitchener, one of several maintained by the Grand River Conservation Authority. Parks such as these supplement our provincial and national parks. Elora Gorge Park is used not only for recreation, but as a means of educating people in the principles of conservation. Describe the course of the Grand River in Figure 2-48. Estimate the length and width of Elora Gorge Park. List all the recreation facilities provided. What can visitors to this park learn about conservation? Describe a park in your neighborhood or one that you have visited elsewhere that serves the same purposes as Elora Gorge Park.

Indian corn is a fodder crop in the region around Guelph where the growing season of 126 days is shorter than in some other parts of Southwestern Ontario. Dairy farming is very efficient. Many of the farms in the Guelph district are general farms, raising beef cattle and other livestock. To the north and west of Guelph, towards Lake Huron and Georgian Bay, stock raising is the chief form of agriculture. Most of the land is devoted to the production of feed, needed by the animals during the winter. Some farmers grow high-quality oats and barley for sale as seed grain. In such cases, they buy cheaper feed for their own herds from the Prairie Provinces. Some farmers also buy steers from Western Canada and fatten them for the Ontario market. An animal weighing 700 pounds may gain more than 400 pounds during the winter and spring. Such animals can then be sold "on the rail" that is, sent directly to an abattoir for slaughtering instead of being sold live on the open market.

West of Guelph, along the shores of Lake Huron between Goderich and Owen Sound, is the leading beef-cattle region in all Canada. This is the most rural part of Southern Ontario and consists more of



2—48 Elora Gorge Park in the Grand River Valley

plateau than lowland. How does the terrain compare with that of the Niagara Fruit Belt?

Around Kincardine, north of Goderich, on Lake Huron, turkeys, hogs, and sheep are raised. As elsewhere in Southern Ontario, erosion is a serious problem. More attention is being paid every year to the conservation of valuable soil. Much soil has been lost as a result of *gully erosion.*[*]

The climate of this livestock farming district is similar to that of Ottawa. Owen Sound, for example, receives more than 100 inches of snow in an average winter. Its winters are colder and longer than those of London or Windsor.

Tobacco growing

South of Guelph and Kitchener is Canada's chief tobacco-producing area. Most of the crop is grown in Elgin and Norfolk counties, in the area shown in Figure 2-30. A study of a typical farm will explain why tobacco is the most important cash crop grown in Ontario.

> This farm consists of 46 acres, about 35 of which are planted in tobacco. This is the average acreage in tobacco on farms in Norfolk and Elgin counties. The owner of this farm came from Belgium in 1946. Along with farmers from Holland, Germany, Italy, and other European countries, immigrants comprise 60 percent of Ontario's 4000 tobacco growers.

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[*] Gully erosion results from the removal of trees or other vegetation cover and is especially severe on sloping land. Heavy rains form rivulets which flow swiftly, carrying away the soil and forming gullies.

The farm is located on well-drained sand and sandy loams. Soil and climate are the most important factors in growing tobacco. Large quantities of fertilizer—about 1000 pounds per acre—must be applied to the soil. The farmer grows winter rye to reduce erosion of the soil by wind and water and to improve its quality. This crop is seeded in the autumn after the tobacco harvest. When it is harvested the following summer, the straw from the rye is disked under the soil. By growing rye and clover in rotation with tobacco, the soil is conserved. A field planted in tobacco year after year would soon be ruined. Reforestation is being undertaken in all tobacco counties, to check soil erosion.

Tobacco has specific climatic requirements. Too little spring rainfall will prevent the necessary rapid growth. Too much rain during the summer season will prevent proper ripening. A rainfall of 14 inches between May 1st and the end of harvesting (in late September) is considered adequate. At Delhi, in Norfolk County, as little as 7 inches and as much as 20 inches have been recorded during this period. In dry years, overhead sprinkler irrigation is necessary.

Tobacco is very easily damaged by frost. Such damage can be very severe even when the official temperature remains above freezing. The official temperature is recorded four feet above the ground. If this is 33°F., the temperature may be several degrees lower at ground level.

The following information from various crop years indicates the climatic difficulties faced by tobacco farmers.

1946: Cool, cloudy weather in early August delayed the harvest. Early frosts on September 2nd and 3rd destroyed 8,000,000 pounds of tobacco.

1947: Cool, wet weather in the late spring caused the spread of black root-rot disease. (The tobacco plant can be attacked by fifteen different diseases.) A lack of rain in early August caused severe damage to the crop.

1948: A good year, with frequent spring showers promoting early growth of the crop. No serious frosts.

1949: Late frosts on May 24, 25, 26, 27, and on June 7 destroyed nearly half the transplanted crop.

1950 and 1951: Dry weather and early frosts caused damage and losses.

1952: A good year except for a severe wind and hail storm that damaged 700 acres of tobacco on August 15th.

This is an account of seasonal operations on the farm:

May: Seedlings are started in large greenhouses in late April and early May. Steam is pumped into the beds to check various diseases. Transplanting starts about May 20th.

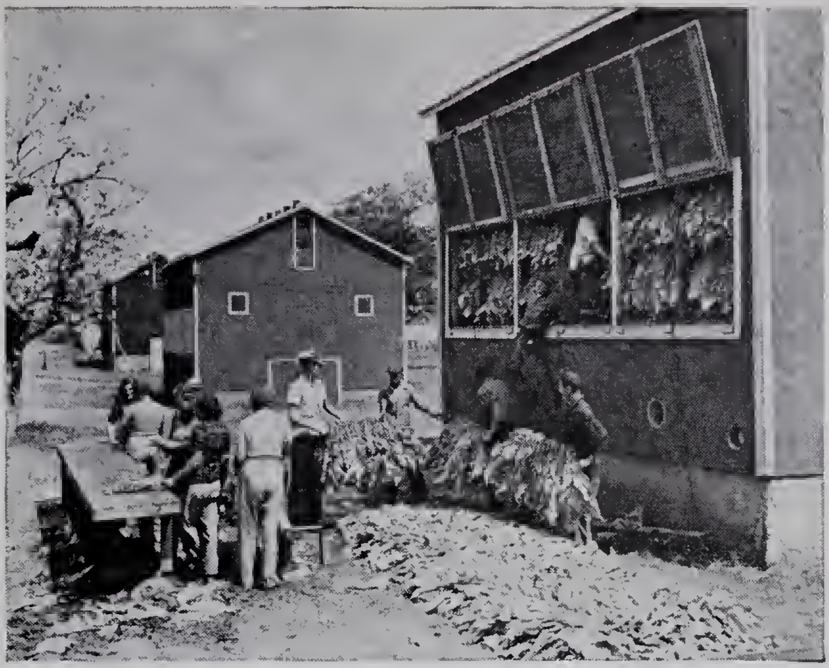
June: Transplanting finishes about June 10th.

July: Crop grows and begins to ripen. Spraying and thinning are carried out.

August: Harvesting commences about August 10th. Large, mature leaves near the base of the plant are taken first. Several pickings of each plant are necessary as leaves mature at different times. Pickers and curers crowd into the tobacco towns for harvest work. Picking is hard work and pays from ten to fifteen dollars per day.

September: Harvesting ends on September 25th. The average acre yields 1200 to 1400 pounds of tobacco.

As harvesting proceeds, the tobacco is hung in kilns to dry. A kiln averages 23 feet by 24 feet in dimensions and may have six rooms.



2—49 Workers loading tobacco into a kiln on a farm in Norfolk County (Ontario Department of Travel and Publicity photo)

Temperature and humidity are strictly controlled as leaves must be "yellowed" by maintaining an even temperature. Heating is by oil, gas, coal, or wood burners. The temperature is steadily increased for several days. This dries out the leaves. A single kiln may hold 1200 pounds of tobacco. Figure 2-49 shows tobacco being loaded into a kiln. The women at the table prepare the leaves for hanging in the kiln. Notice the holes in the sides of it. These provide ventilation. After curing, the tobacco is sent to a factory for production into cigarettes. Twelve counties of Southern Ontario produce 90 percent of Canada's flue-cured tobacco crop.

A summary of tobacco farming in Southern Ontario

1. Describe the soil and climatic conditions necessary for the cultivation of tobacco.
2. List several reasons why tobacco is an especially difficult crop to grow.
3. Describe the seasonal work on a tobacco farm between May and October.
4. (a) What is a kiln?
(b) Describe the main features of a kiln as shown in Figure 2—49.
(c) A greenhouse is another important structure on a tobacco farm. Locate a greenhouse in the centre background of Figure 2—49.
5. In 1960, our tobacco farmer received 55 cents per pound for his tobacco crop. His yield averaged 1357 pounds of tobacco per acre. What were his total receipts from tobacco?

Norfolk County was once a centre of general farming. Much land was abandoned because of the poor quality of the soil and the serious erosion. Tobacco growing has restored prosperity to the people of this area.

2—50 Harvesting sugar beets near Chatham in Kent County (Ontario Agricultural College photo)

Cash crop counties

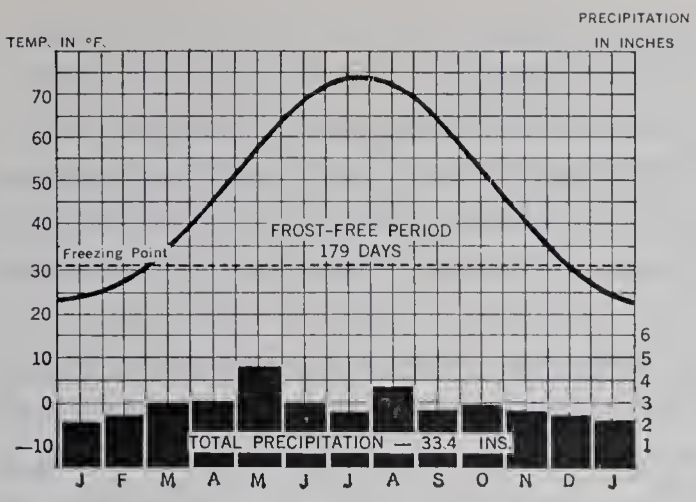
Southwest of the main tobacco region lies the greatest "cash crop" agricultural area in Canada. This includes the four counties of Kent, Essex, Middlesex, and Lambton, shown in Figure 2-3. These counties include the Canadian Corn Belt, an area of level land, fertile soils, and warm humid summer climates, similar to the Corn Belt of the United States Midwest. Locate this region on the agricultural map in Figure 2-30. However, although corn occupies more acreage than any other crop, it by no means accounts for even half the acreage and is only one of at least 30 different crops grown there. Study Figure 2-50. What work is being done in this photograph? Describe the landscape.

This part of Southwestern Ontario has the longest growing season of any region in Canada outside Southwestern British Columbia.

The climatic graph of Windsor (Figure 2-51)

1. What is the length of the growing season here? How does it compare with the growing season (a) in the Niagara Fruit Belt? (b) in your neighborhood?
2. (a) What is the January average temperature at Windsor?
(b) How many months have an average temperature below freezing? How does this compare with Ottawa, which will be studied in Figure 2—65?
3. Describe summer temperature conditions at Windsor.
4. What is the total annual precipitation at Windsor? This includes 37.5 inches of snowfall. Compare this annual total with that of Ottawa. Suggest one important reason for the difference.
5. How much rainfall occurs during the height of the growing season, in the months of June, July, and August? Much of this occurs in thunderstorms. Droughts sometimes make irrigation necessary in the Canadian Corn Belt.

An average farm in the Corn Belt consists of 190 acres, of which 123 are in crops. The farmer also keeps 24 animals, including hogs, a few beef cattle, and, possibly, a few dairy cattle. Farmers tend to specialize in the production of various crops. However, most raise

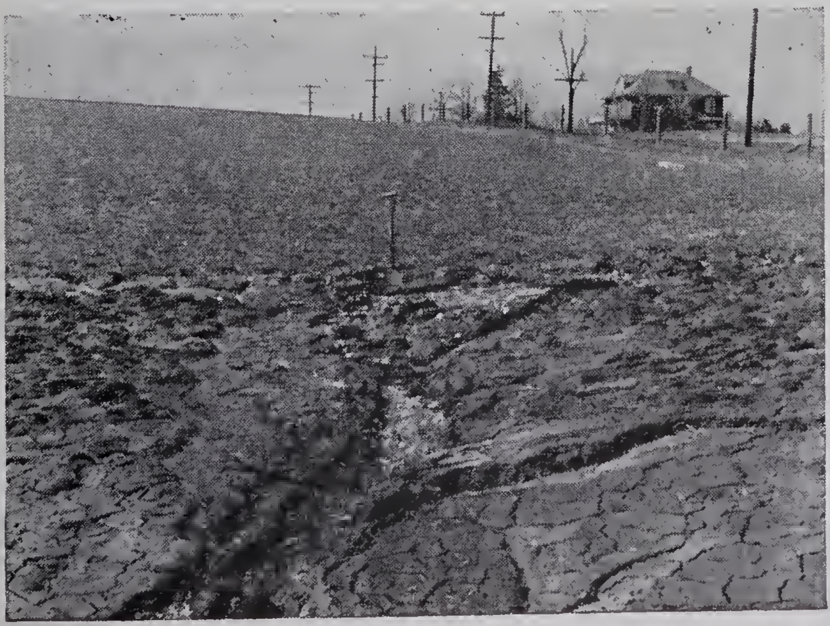


2—51 The climatic graph of Windsor, Ontario

some corn, with yields averaging 45 bushels to the acre. Some corn is sold as a cash crop and the rest is kept for animal feed.

Southwestern Ontario is the only part of Canada with really suitable moisture, temperature, and soil conditions for cultivating winter wheat. About one third of the total acreage is sown in Essex and Kent counties. Yields average 33 bushels to the acre, which is nearly twice the yield of many spring wheat regions of the Prairie Provinces. About half the crop is fed to animals on the farm and the rest is sold for cash. Winter wheat is an excellent "cover crop" that prevents soil erosion, especially that caused by spring rains. How is this illustrated by Figure 2-52? What has happened to the soil in the foreground of this picture? How can you tell that this photograph was taken during the spring? When winter wheat is cultivated, the use of labor and machinery over more months of the year is more economical.

In Kent County, soybeans occupy one quarter of the farmland, more than any other crop except corn. Used as animal feed, fertilizer,



2—52 Cover crop of winter wheat helps prevent soil erosion. (Ontario Agricultural College photo) and as a source of oil in the manufacture of paint, soap, and other products, soybeans are one of the major crops of Southern Ontario.

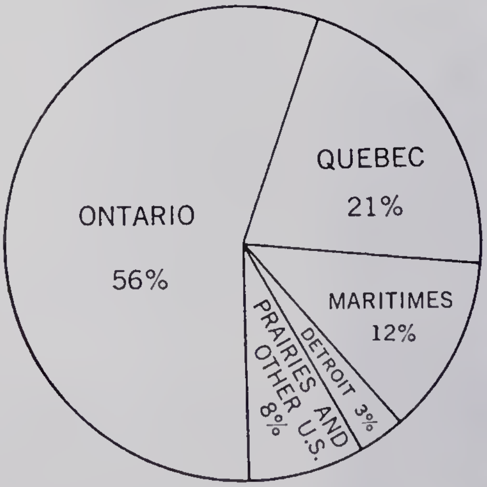
Sugar beets are grown around Wallaceburg and Chatham. Locate these centres in Figure 2-38. Southern Ontario ranks next to Southern Alberta as the most important Canadian producer of this crop. A valuable by-product is the plant top which a farmer can sell as cattle feed.

Southwestern Ontario is by far the most important region in Canada for the production of commercial vegetables, of which more than half are sold fresh. Potatoes and tomatoes are the most important crops. Other vegetables include onions, cantaloupe, asparagus, cauliflower, celery, carrots, and beans. Figure 2-53 shows where these fresh vegetables are marketed.

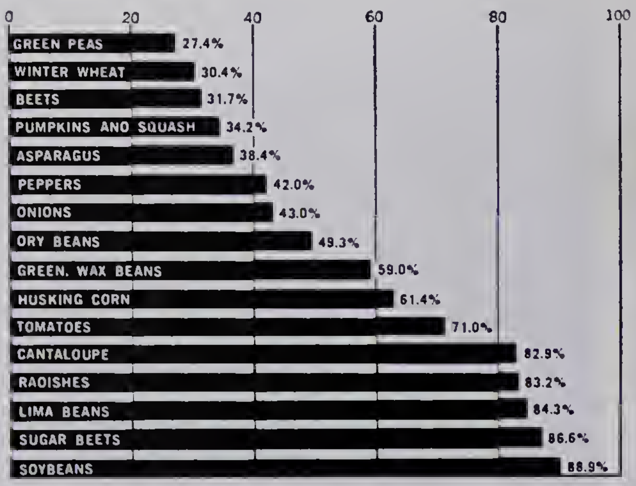
How important is Ontario as a market for this fresh vegetable production? Which province ranks next in importance as a market? Vegetables are sent to Ontario and United States markets by truck. They reach other markets by rail. Four fifths of the output is shipped in June, July, and August. Cucumbers are an example of a crop shipped in February, having been grown in hothouses over the winter.

Southwestern Ontario is Canada's largest source of vegetables for processing. Large canneries are located at Leamington and other points. The freezing and manufacture of vegetables and fruit juices are important aspects of processing.

Farms in the counties of Essex, Kent, and Lambton, the richest agricultural region of the Southwest, are smaller than in the Canadian Corn Belt as a whole. In Essex County, for example, they average only 71 acres in size. For the three counties concerned, they average 102.5 acres in size. Although they contain only 7.7% of Ontario's farm



2—53 Where southwestern Ontario fresh vegetables are sold



2—54 Essex, Kent, and Lambton produce as percentages of Ontario output acreage, Essex, Kent, and Lambton produce the percentages (by value) of the province's total production shown in Figure 2-54.

The waters of the Great Lakes supplement the land as a source of food. Lake Erie accounts for about half the output of Southern Ontario's fisheries. Dore*, whitefish, blue pickerel, and perch comprise most of the catch. About 3500 men and 1600 vessels are active in the industry. Pollution of the lake waters has created problems. Even more serious has been the appearance of the *lamprey,* a salt water, eel-like fish which feeds on the other fish. Scientists have found a way to kill the lamprey by putting a chemical in the water that does not harm other fish.

Cities and manufacturing industries of Southwestern Ontario

Although Southwestern Ontario does not contain any cities as large as Toronto or Hamilton, it contains more moderate-sized centres of population than any other part of the province. This is not true of the area drained by Lake Huron and Georgian Bay where Goderich and Owen Sound are the only towns of importance. The former is famous for its salt deposits which comprise one of the few minerals of significance in Southwestern Ontario. Both Goderich and Owen Sound are major handlers of western grain. The latter is the centre of a rich livestock-raising belt and is notable as the chief port of Georgian Bay. Owen Sound's 47 factories make a wide variety of small manufactured goods.

Guelph has been mentioned earlier as the headquarters of the Ontario Agricultural College and as the centre of a rich and varied farming region. A city of 40,000 people, Guelph has more than 100 manufacturing establishments. The making of electrical goods, heating equipment, and iron and steel products employs the largest number of workers.

Kitchener and Waterloo are considered, along with surrounding towns and villages, as a single metropolitan region. In 1961, the total population of this metropolitan region exceeded 155,000 people. Of this number, about half live within the city limits of Kitchener. The city has grown rapidly as the following population figures show:

1852	1900	1910	1920	1930	1940	1950	1960	1961
782	9,696	14,600	23,027	31,114	33,450	43,084	69,952	74,485

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*Wall-eyed pike, named for its color (doré-golden); also spelled *dory.*

How has Kitchener grown during a century?

1. How many times greater than the population in 1852 was the population in 1950? How many times has your town multiplied its population during the same period of nearly a century?
2. (a) During which decade between 1900 and 1960 did Kitchener add the least number of people?
(b) During which decade did it add the greatest number of people?
3. During the period 1940 to 1960, Kitchener more than doubled in population.
(a) Compare this rate of growth with that during the period 1920-1940.
(b) Compare this rate of growth with that of your town during the 1940-1960 period.

Rapid growth of population has been a feature of most Canadian towns and cities since the end of World War II.

Kitchener and Waterloo are noted for a variety of manufacturing. Average income in the region is estimated to be 31 percent above the national average for Canada. The manufacture of foods and beverages, leather products, and wood products are among the chief industries. Although there is little local wood now available, many towns in Southern Ontario remain major producers of furniture and other wood products. Their raw materials must be imported, but such industries are examples of the type that continue in the place where they began. Crafts and skills, passed often from father to son, partly account for this fact. A tradition of this kind often helps to explain why a place continues to produce a commodity when it no longer has the advantages of location that it may have had originally.

Kitchener and Waterloo rank as the sixth largest urban centre in Ontario. Two universities and other institutions of various kinds serve the region.

Galt is almost within the metropolitan region of Kitchener-Waterloo. Located on the Grand River, it is noted for the manufacture of shoes, textiles, chemicals, and metal goods. Brantford, located 15 miles to the south, also on the Grand River, is about twice the size of Galt, with a population of 55,000 people. Machinery, tools, textiles, clothing, and flour are among the manufactures.

As early as 1793, London was considered a possible capital for Upper Canada. However, settlement was delayed until 1825. When, in 1840, the first roads linked the small village to Lakes Erie and Huron and when the first railway arrived in 1854, it was clear then, as now, that London had a very fine central position in Southern Ontario. Study Figure 2-38. How far is London from Windsor? From Toronto? From Hamilton? Locate Port Stanley on the map. This serves as a port for London. One reason that London and other large cities to the north of Lake Erie are located inland instead of on the lake is the lack of good harbors. However, London's connection with Port Stanley and with Sarnia is helping it to take some advantage of the St. Lawrence Seaway. Where is Sarnia in relation to London? Trace the route of Highway 401 in Figure 2-38. This great modern road runs from Windsor, northeast via London and Toronto, to the Quebec-Ontario boundary. It links the major towns and cities of Ontario, and more than three quarters of the population of the province lives within 25 miles of it. Where does Highway 401 pass through the neighborhood of London? This new road enables the city to take better advantage of its central position. Many of London's new industries are being located near it.

London had a population of 170,000 people according to the 1961 census. The population is expected to double by 1980. As in the case of other cities studied, this rapid increase is bringing many problems with it. London has a very attractive location astride the Thames River. Unfortunately, some industries have disfigured part of the river bank and have polluted the water. There have also been serious flood problems, although floods are now being controlled by dams built throughout the Thames River basin. At the same time, London has suffered from a water shortage. The water table – or the level of the water beneath the surface of the ground – has been dropping. As a result, wells have run dry. Although the dams already mentioned have helped to increase the water supply, the needs of the city remain great. If new industries are to be attracted, more water must be obtained. Construction of a water pipeline from Lake Erie has been suggested.

Some of the Thames River shoreline at London consists of fine parkland. It is planned to increase this parkland in the future and to stop the pollution of the river. The central area of the city is very old and has been neglected. Many buildings are run down and most streets need improvement. Due to the wise action of those who planned London in the beginning, the main streets are 132 feet wide. Such streets are well suited to the age of the automobile. Redevelopment of the central area will be easier than in some old cities. Planners have drawn up a scheme for the future development of several areas of London. One of these plans is shown in Figure 2-55.*

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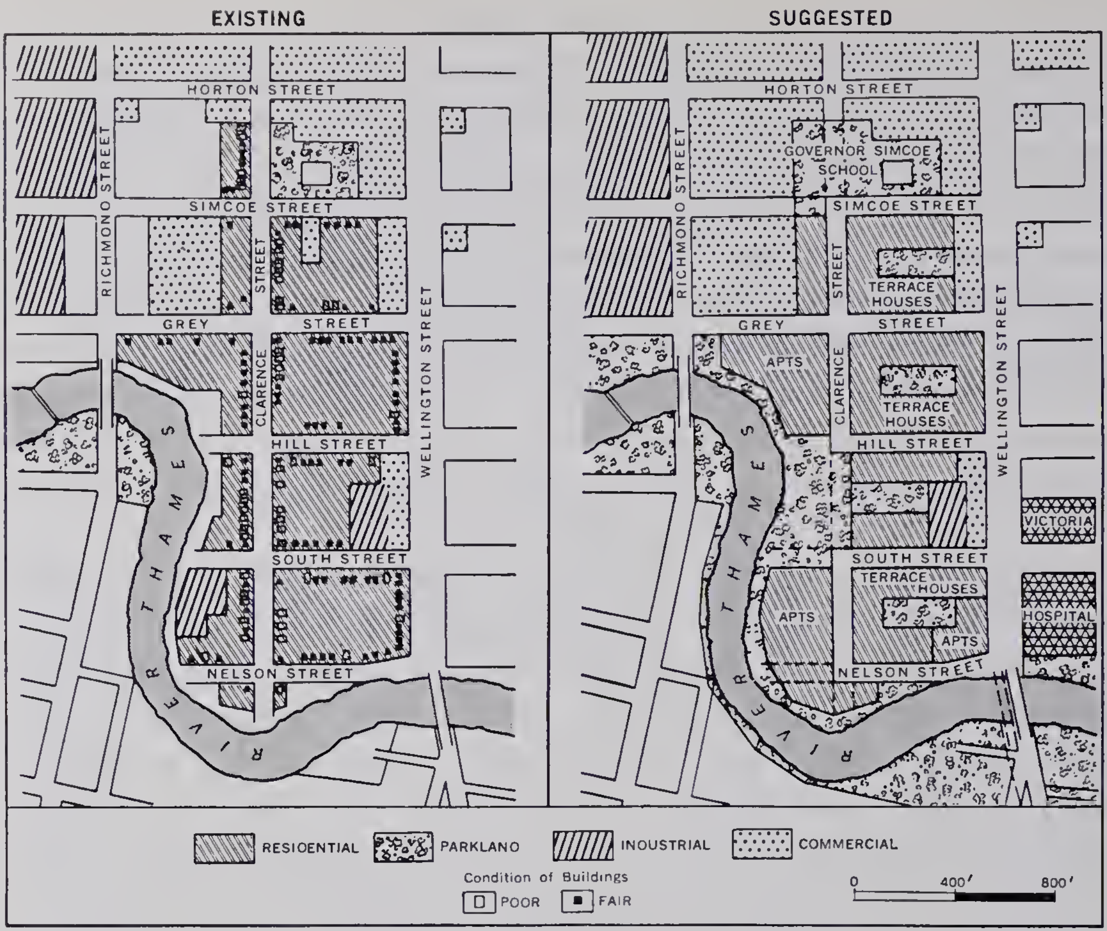
*Material and maps used here are based on "Urban Renewal, London, Ontario – A Plan for Development and Redevelopment, 1960-1980," supplied by courtesy of the Corporation of the City of London.



2—55 A suggested plan for the redevelopment of an area of downtown London. The top of the map is towards the north.

How is modern town planning helping to improve London?

1. Describe the course of the Thames River through this area.

2. The dots in Figure 2—55 represent existing buildings. Many of these are old and will be torn down.

(a) Which street contains the greatest number of old buildings?

(b) Will existing industrial areas in this district be greatly extended by the redevelopment plan?

(c) What types of buildings will replace those to be demolished? Will this result in an increase or a decrease in population?

(d) What is meant by commercial land? Suggest a possible reason why the commercial area will be extended as a result of the plan?

(e) What are likely to be the occupations of some of the people who will live in the new apartments, especially along the west side of Wellington Street?

3. Describe where new parklands will be located in the area as a result of the development plan.

4. (a) Describe what you would expect to see when the redevelopment has been completed, if you took a walk from the south side of the bridge across the Thames on Richmond St. to Simcoe St.

(b) Proceed east along Simcoe St. and along Wellington St. back to the Thames River. Again, describe what you would see. In which direction would you be travelling along Wellington St.?

(c) Estimate the total distance travelled on your walk.

5. Find out if there are any plans for the redevelopment of parts of your town. If so, compare these plans with those for London.

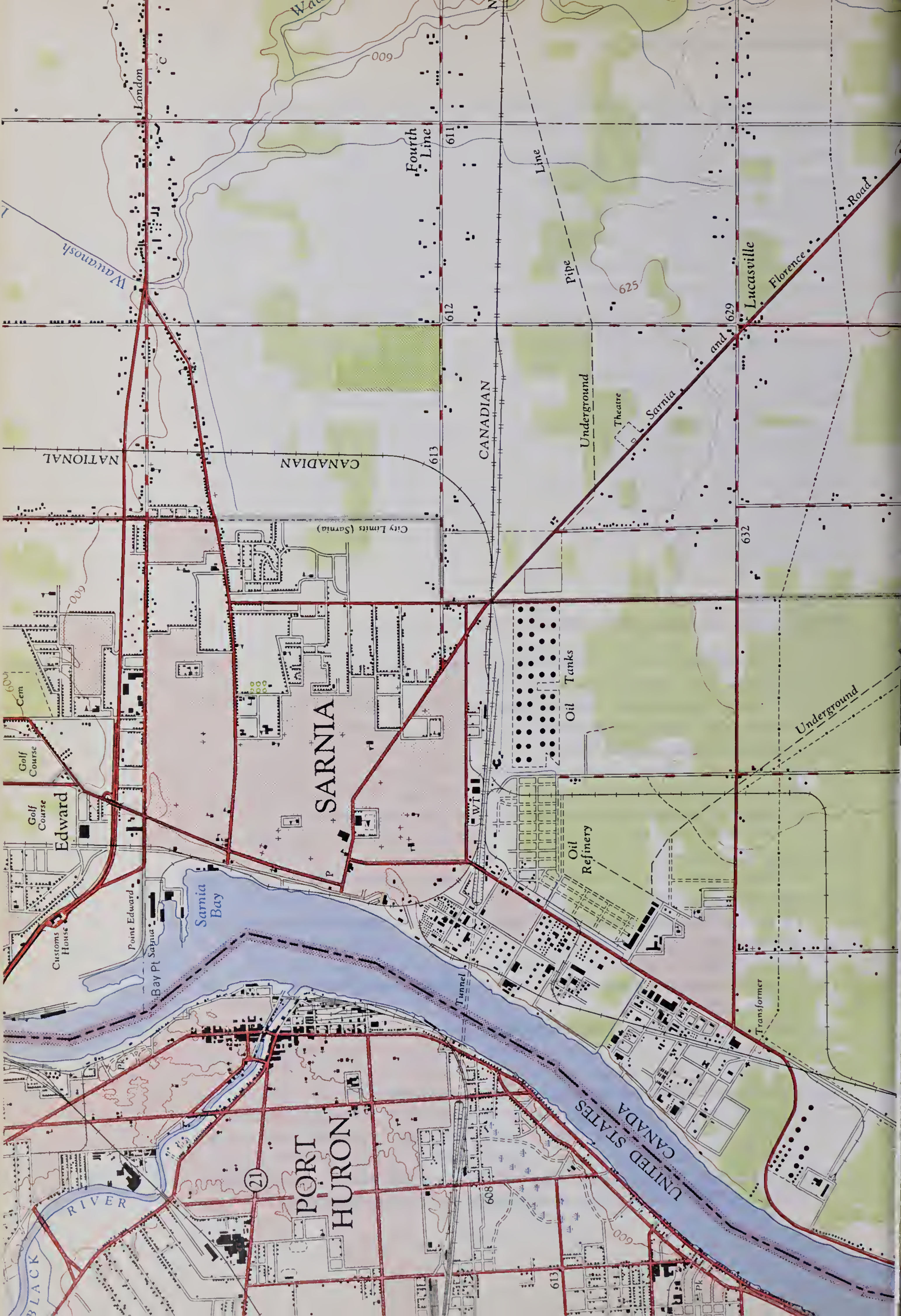
The coming of the railway brought the first large industries to London. These included brewing, the manufacture of iron and steel goods, and the making of machinery. All these industries are still carried on in the city. In addition, London's 300 factories produce refrigerators, electrical goods, paper products, textiles, and various processed foods. The University of Western Ontario, located there, is the leading educational institution of Southwestern Ontario.

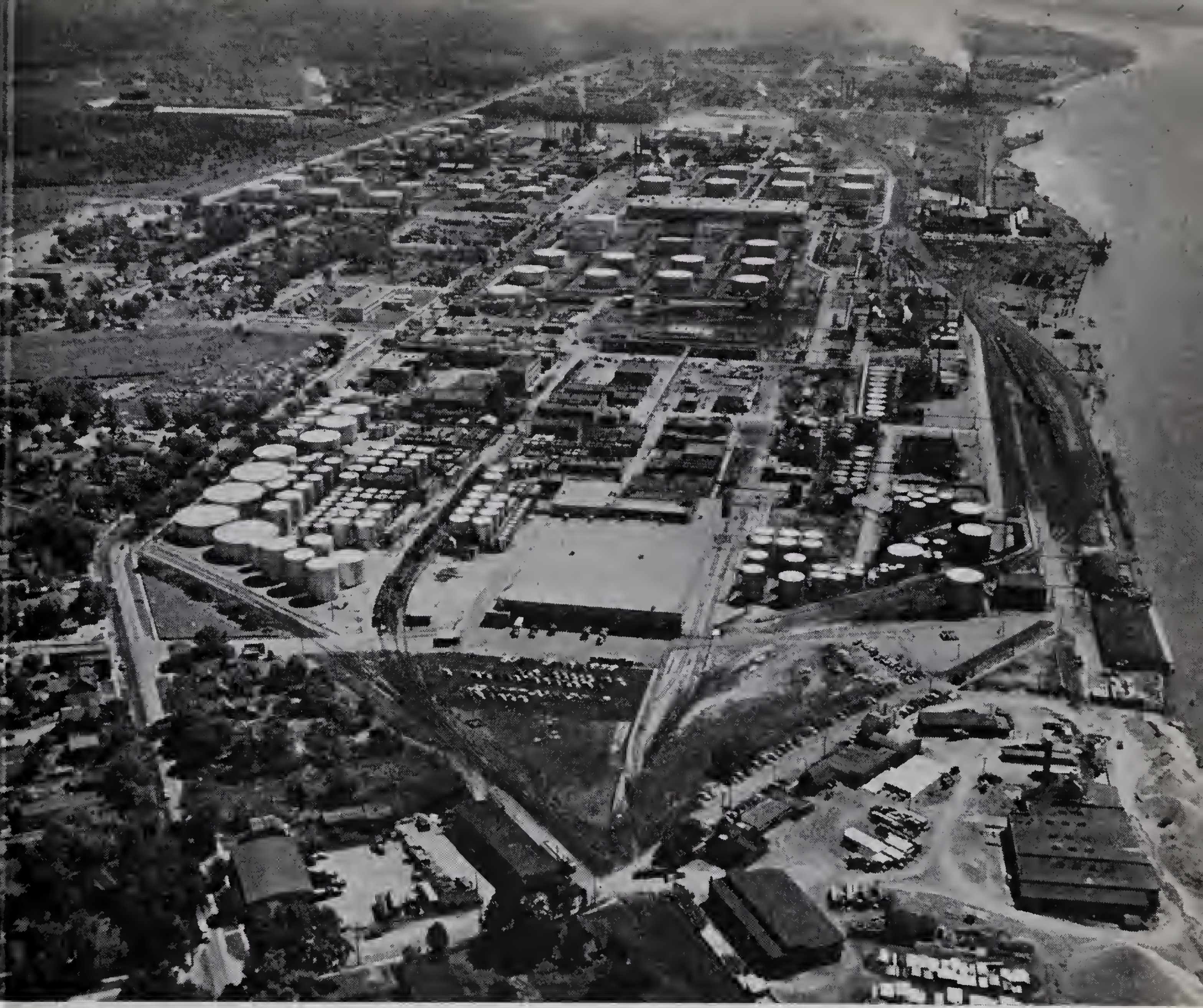
Where does St. Thomas lie in relation to London, according to Figure 2-38? It is an important railway centre and has flour mills and various plants that process dairy products. Its machine shops and knitting mills are noteworthy. Where does Woodstock lie in relation to London? Like St. Thomas, it produces dairy products. Furniture, textiles, and machinery are among the other goods made there.

Sarnia, with a population of nearly 51,000, has been one of the fastest-growing cities of Southern Ontario in recent years. Locate this important port and industrial city in Figure 2-2. Now refer to Figure 2-56 which shows a large-scale map of Sarnia and of part of the area surrounding it.

Sarnia — an important international border point

1. (a) What evidence of an international boundary do you see?
(b) Which river serves as the international boundary?
(c) In which direction is the river flowing?
(d) How wide is the river between Sarnia and Port Huron?
(e) In which state is Port Huron?
(f) Name two bodies of water connected by the river.
(g) List the various means of communication between Sarnia and Port Huron.
2. What is the approximate elevation of Sarnia above sea level?
3. How does the map indicate that the farmland surrounding Sarnia is low-lying and flat?
4. When Sarnia was first settled, the land was surveyed and divided into townships, concessions, and lots.
(a) What evidence is there that the land around Sarnia was carefully surveyed?
(b) Describe the location of the houses and other farm buildings in relation to the roads.
(c) Which roads are more densely settled: those running east-west or those running north-south?
(d) What are the green patches running between the east-west roads? Account for their location.
5. Study the site of Sarnia.
(a) Estimate the area of the built-up section (shown by pink shading).
(b) To which of the following cities or towns is Sarnia nearest in population: Toronto, Vineland, Oshawa, Hamilton? Confirm your answer by reference to Table 2a, on page 486.
(c) The refining and transportation of oil and its products is the chief industry of Sarnia. What proof of this statement may be seen on the map?


Waw
London
Wawanosh
600
Fourth Line
611
612
613
Line
Pipe
625
CANADIAN
NATIONAL
CANADIAN
Underground
Theatre
Sarnia and Lucasville Road
Florence
629
632
City Limits (Sarnia)
SARNIA
Oil Tanks
Oil Refinery
Wt
Underground
Cem
600
Golf Course
Golf Course
Edward
Customs House
Point Edward
Sarnia Bay
Bay Pt
Sarnia
P
Tunnel
Transformer
UNITED STATES
CANADA
PORT HURON
21
BLACK RIVER
608
613
600
Pk



2—57 Aerial view of the main industrial zone of Sarnia (Douglas Paisley Studio photo)

2—56 (opposite) Sarnia and area in scale 1:50,000 from Topographic Survey Series (Sheet 40J/16 west half)

(d) Name four means of transportation used for the movement of oil and its products.

(e) In which direction from the centre of Sarnia does the main industrial area lie?

(f) What forms of land use are indicated to the north of the city?

6. In which direction does Sarnia's residential area appear to be growing? Why is it growing in this direction?

7. Study the photograph in Figure 2—57.

(a) In which direction was the camera pointing when this picture was taken?

(b) List all the means of transportation found on the map that are visible in this photograph.

(c) What type of industry, noted on the map, is evident in the photograph?

8. (a) How does Port Huron compare in size with Sarnia?

(b) List some reasons for the importance of Port Huron.

(c) Port Huron and Sarnia are twin cities along the Canada-United States border. On an atlas or wall map locate three other examples of such twin towns or cities in Ontario and nearby American states.

Our study of Sarnia has indicated its importance as a port, a border city, a transportation hub, and an industrial centre. Sarnia's harbor handles large quantities of grain, oil, and petroleum products. During the navigation season, an average of 83 ships pass the city every 24 hours.

Although some oil is produced in the Sarnia district, most of the petroleum handled or processed here comes from Western Canada. The city is the terminus of the main pipeline from that region. Locate this pipeline on the map in Figure 2-39 on page 62. Sarnia's importance as an oil-refining centre is shown in Figure 2-39. Its facilities include the largest single oil refinery in Canada. During World War II, the city became the centre of Canada's *synthetic rubber* industry, which depends on oil, coal, salt, and large amounts of fresh water. Today, Sarnia supplies all of Canada's synthetic rubber needs and exports this product to 50 different countries. Many *petrochemicals** are produced there, the most important of which is used in making detergents.

The farmland around Sarnia lies to the north of the Corn Belt. Although marshy and low-lying, it is very fertile when drained. Thedford Marsh, north of the city, produces truck crops similar to those grown in Holland Marsh.

Windsor — Canada's fifth manufacturing city

A booklet published by the Greater Windsor Industrial Commission in 1961 included the following advertisement:

> "Greater Windsor is located in the most densely populated section of Canada . . . .
> Windsor is the most southerly city in Canada and the largest Canadian city on the Canada-United States border . . . .
> For an industrial location offering:
> - Factory sites at reasonable cost (serviced and raw)
> - Male and female technically skilled and production workers
> - Air, rail, road, and water transportation facilities
> - Electrical power, natural gas, and water . . .
>
> you should investigate Windsor, Ontario."

1. Which region is "the most densely populated section of Canada"?
2. Review the questions on page 18 and note again the latitude of Windsor in comparison with other Canadian cities.
3. What is meant by "serviced" and "raw" factory sites in the advertisement?
4. What important water transport facilities are available at Windsor? Review Figure 2—38 and note the important railway and road connections with other parts of Southern Ontario.
5. Which great American city lies directly west of Windsor, on the opposite bank of the Detroit River?

*Petrochemicals are extracted from petroleum. They include carbon black, sulphur, and various forms of alcohol.

As Canada's fifth manufacturing city and tenth largest urban area, Windsor has expanded rapidly since 1950. The city now has a population of 114,000 and nearly 200,000 people live in the metropolitan region. The advertisement just studied suggests several reasons for Windsor's importance. The city is served by five railways, a large airport, and several major highways. A bridge, two tunnels, and a ferry service connect the city with Detroit. Each year 21,000,000 people and 2,000,000 automobiles cross the border.

Early settlement in the region began when the French established Fort Detroit in 1701. In 1749, a mission was established on the west side of the Detroit River. When the Detroit side officially became United States territory in 1796, many French settlers, preferring British rule, moved to the Canadian side. As a result, much farmland is still laid out in long, narrow strips, similar to that of the Province of Quebec. Descendants of the original French settlers still make up nearly one fifth of the population of Greater Windsor. Windsor, like Sarnia, can only expand eastward. Why is this so? The Detroit River is the busiest waterway in the world. It is open for 262 days in an average year. During the navigation season, a ship sails to or past Windsor every 20 minutes. The harbor of Windsor is easily able to import the raw materials it needs. Manufactured goods produced in the city are also shipped out by water to some extent. Windsor is best known as an industrial city. In 1960, there were 21,554 workers engaged in manufacturing. They were employed in 435 industries, of which the most important were:

Foods and beverages	2,956 workers
Iron and steel products	4,143 workers
Transportation equipment	13,061 workers

Other forms of manufacturing included textiles, clothing, wood products, printing and publishing, chemicals, and electrical goods. More than half of Canada's salt is mined near Windsor. Oil, natural gas, and building materials are produced in Essex and nearby counties.

Figure 2-58 shows a view of one of Windsor's three great automobile factories. Plants like these employ two thirds of those engaged in manufacturing at Windsor. The Chrysler Corporation's properties cover 350 acres. Fifty-seven of these acres are under one roof, shown in the centre of the photograph. Suggest reasons why a large, uninterrupted, single-floor organization is the most efficient way to manufacture automobiles. Why has Windsor become such an important centre for the Canadian auto industry?

2—58 The main plant of Chrysler Corporation at Windsor (Hunting Survey Corporation photo)

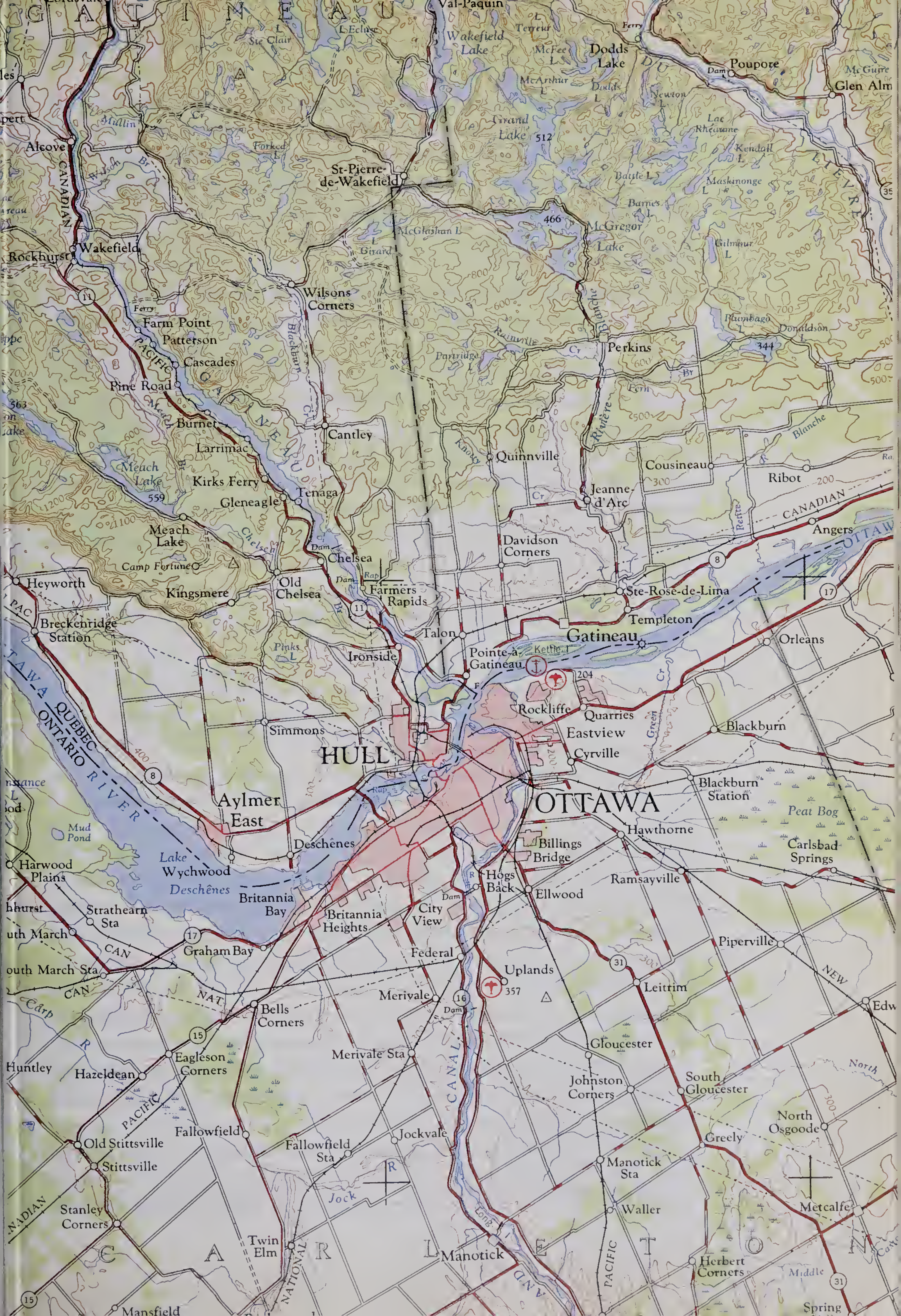
In addition to manufacturing, other groups of occupations employing large numbers of people in Windsor include the following:

Owners and managers	5,533
Professional workers	4,695
Clerical	8,927
Construction	3,490
Transportation and Communication	4,566
Commercial and financial	4,198
Service workers	5,198
TOTAL	36,607

2—59 Persons engaged in non-manufacturing occupations in Windsor, 1960

Compare the above total with that engaged in manufacturing. Name at least one type of job done by a worker in each of the groups listed above. Although it is often said that "most" people in our large cities are employed in manufacturing, this is seldom true. It is not true even in such an industrial city as Windsor, as the above figures show. This is because, for every worker engaged in manufacturing, there must usually be at least two other persons working to provide him with various services. In the United States and Canada today, the number

2—60 (opposite) Ottawa-Hull area in the scale 1:250,000 (National Topographic Series, Ottawa Sheet 31G)


G A T I N E A U
Val-Paquin
L'Ecluse
Ste Clair
Wakefield Lake
Tergeur L
McFee L
Ferry
Dodds Lake
D U
Dam
Poupore
McGuire
Glen Alm
Mullin
Cr
McArthur L
Dodds L
Newton
Grand Lake
512
Lac Rheaume
Alcove
CANADIAN
Forked L
Wilson
Br
St-Pierre-de-Wakefield
Kendall L
Battle L
Maskinonge L
L I E V R E
35
Barnes L
466
McGregor Lake
McGlashan L
Girard
Gilmour L
800
Rockhurst
Wakefield
11
Wilsons Corners
Blanche
Ferry
Farm Point
Patterson
Blackburn
Plumbago L
Donaldson L
344
Cascades
PACIFIC
G A T I N E A U
Partridge L
Rainville
Cr
Perkins
Br
700
Pine Road
600
Fern
563
Meach
Burnet
500
Rivière
Larrimac
Cantley
Blanche
Meach Lake
Br
Quinnville
Knox
Cousineau
Ribot
200
Kirks Ferry
Jeanne-d'Arc
300
Cr
Gleneagle
Tenaga
559
1200
1100
Reitte
CANADIAN
Meach Lake
Chelsea
Angers
OTTAWA
Dam
Chelsea
Davidson Corners
8
Camp Fortune
Heyworth
Dam
Rap
Farmers Rapids
Ste-Rose-de-Lima
17
Kingsmere
Old Chelsea
PAC
Br
11
Templeton
Breckenridge Station
Talon
Gatineau
Orleans
Pinks L
Ironside
Pointe-a-Gatineau
Kettle I
204
QUEBEC
ONTARIO
OTTAWA RIVER
400
F
Rockliffe
Quarries
Simmons
Green
Cr
Eastview
Blackburn
HULL
Cyrville
200
8
Aylmer East
Rap
Blackburn Station
OTTAWA
Peat Bog
Mud Pond
Deschênes
Billings Bridge
Hawthorne
Carlsbad Springs
Lake Deschênes
Wychwood
R
Harwood Plains
Hogs Back
Ramsayville
Ellwood
Britannia Bay
Dam
Strathearn Sta
Britannia Heights
City View
South March
17
Graham Bay
Federal
Piperville
CAN
300
31
South March Sta
CAN
NAT
Uplands
357
NEW
Carp
Merivale
16
Dam
Leitrim
Edw
Bells Corners
15
R
Gloucester
Merivale Sta
CANAL
Huntley
Hazeldean
Eagleson Corners
North
Johnston Corners
South Gloucester
PACIFIC
North Osgoode
Fallowfield
Old Stittsville
Jockvale
Fallowfield Sta
Greely
Stittsville
Manotick Sta
R
Jock
Waller
CANADIAN
Stanley Corners
Metcalfe
Long
Twin Elm
NATIONAL
Manotick
C A R L E T O N
PACIFIC
Herbert Corners
Middle
Castor
31
15
Mansfield
Spring

of people engaged in non-manufacturing occupations is constantly increasing in relation to the number engaged in manufacturing. Automation is one reason for this. What is meant by "automation"? What other reasons explain why non-manufacturing work is expanding at the expense of manufacturing employment.

EASTERN ONTARIO

This region includes all of Southern Ontario east of Kingston. Most of the land here is very flat and consists of the lowland plain formed by the valleys of the Ottawa and St. Lawrence rivers. Figure 2-62, showing the western edge of the city of Cornwall illustrates the level nature of this plain. Such land is really a continuation of the St. Lawrence Lowlands of Quebec. It is separated from South-Central Ontario by a portion of the Canadian Shield.

The Thousand Islands, which occur there, provide Eastern Ontario with one of its greatest tourist attractions. What other tourist attractions exist in the region? What recent developments have encouraged the growth of industry in Cornwall and Kingston?

A topographic map of part of the Ottawa Valley

Study Figure 2—60.

1. On which side of the valley is the Ontario section found?
2. What is the average elevation of the land shown in this section?
3. State three good reasons for believing that this land is quite flat.
4. How many villages can you count south of the Ottawa River? Eastern Ontario contains dozens of small villages like these.
5. What large market for their products would farmers in the area have? (Note the location of other possible large markets besides the city of Ottawa.)

Figure 2-30 shows that the whole of Eastern Ontario is part of the eastern dairy region of the province. In the area shown on the map in Figure 2-60, market gardening, potato growing, and livestock raising are important. Hogs and poultry are raised in addition to dairy and beef cattle. Dairy farms throughout Eastern Ontario are similar to those of the neighboring Montreal Plain which will be studied on pages 137-147. An important difference, however, is the specialization in cheese production in Ontario. The famous cheddar cheese of this region is sold throughout Canada. Hay, corn, and oats are the chief crops raised in Eastern Ontario. In most counties south of Ottawa, 80 percent of the land is under cultivation.

The site of Kingston was first visited by Samuel de Champlain in 1615. In 1673, Cataraqui, as Kingston was then called, became an important French fort and fur trading post. After Canada became

British, Kingston was settled by Loyalists who had come to Eastern Ontario in large numbers. In 1784, the townsite was surveyed.

During the nineteenth century, Kingston was an important port, handling lumber and wheat. Shipbuilding was also carried on there. During the period 1841-44, the city was the capital of Canada. Later growth was slow, but during and after World War II, population expanded considerably. The war caused a revival of shipbuilding and new industries were established. It is as the centre of an industrial region that Kingston seems likely to grow in the future.*

The site and functions of Kingston (Figure 2-61)

1. (a) In which direction from the centre of Kingston, at Princess and Division Streets, is Lake Ontario?
(b) Name the river that flows into Lake Ontario at Kingston.
(c) Name the river that flows out of Lake Ontario at Kingston.
2. According to this map, in which direction does each of the following cities lie from Kingston: Montreal, Ottawa, Toronto? Use an atlas or wall map to estimate the distance of each of these cities from Kingston. How does this information explain why Kingston is a more important centre than its size might suggest?
3. In which direction do the main railway lines and Highway 401 lie from the centre of Kingston? Highway 401 is the main road route through Southern Ontario. Trace the course of this important road on the map in Figure 2—38.
4. Kingston has always been a military and educational centre. How is this evident on the map?

The exercise has shown how *service functions* are very important in Kingston. Such functions refer to services performed or work done that do not result in the production of goods. About 40 percent of all persons employed in Kingston are engaged in such activities. The city's importance as a service centre may be seen in its military functions. The Royal Military College is the leading centre for the training of officers for the Canadian Army. The Canadian Army Staff College, the National Defence College, and the Eastern Ontario Defence Headquarters are located there. In addition to the soldiers attached to these institutions, 2000 civilian workers are employed. Queen's University is one of Canada's leading institutions of higher learning and employs 800 people. There are five hospitals in the city, employing around 2000 people. Kingston is also the headquarters of four federal penitentiaries. These employ 750 people. Because Kingston is the only sizable city within 100 miles, it has become a regional capital. Various government offices, both provincial and federal, are located there. They give employment to many people.

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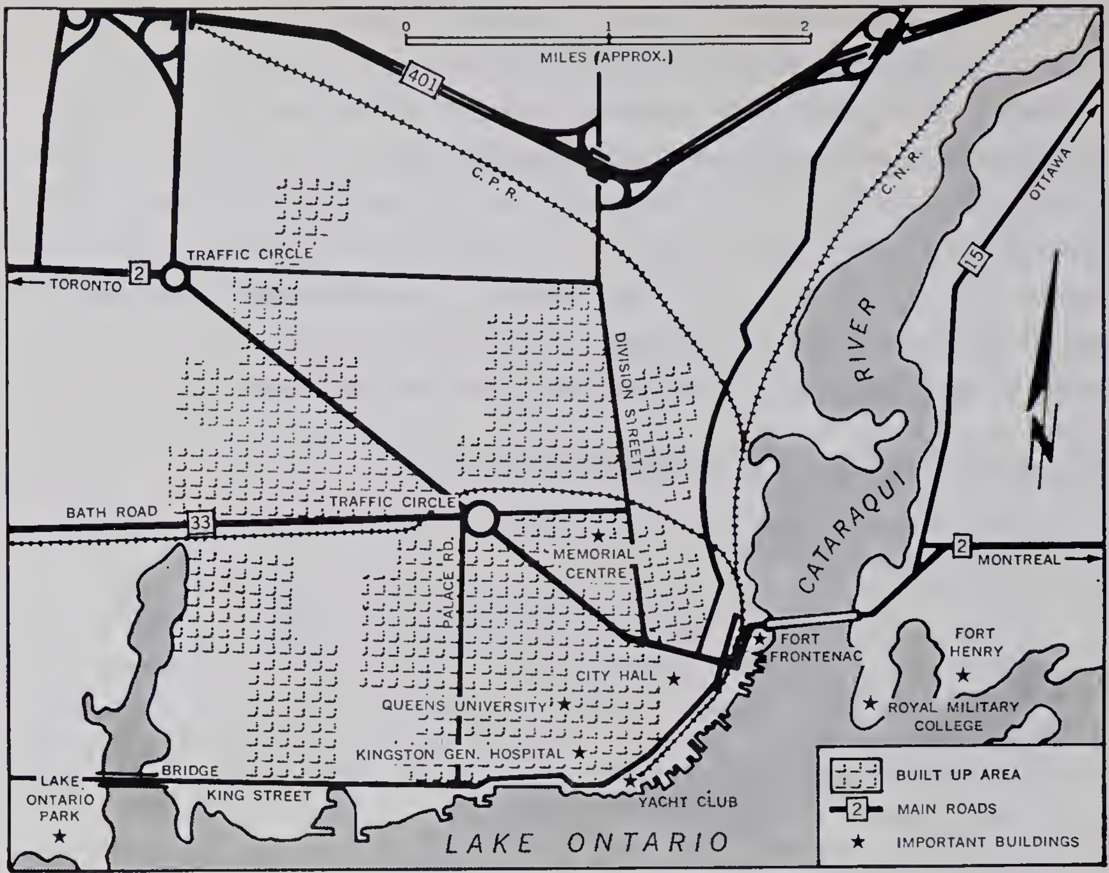
*This study, based on "A Planning Study of Kingston, Ontario," published in 1961 by the Corporation of the City of Kingston, is available for $1.00.



2—61 Large-scale map of Kingston. Princess Street, the main artery, runs diagonally across the map from downtown Kingston to the traffic circle at Highway 2.

Shipbuilding, revived during World War II, has continued in Kingston on a small scale. A major Canadian centre for the manufacture of aluminum products employs 2100 people. A factory making nylon fabrics employs 1400 people. There are several chemical plants in the region. The largest of these employs 650 people. The following figures indicate the growth of industry in Kingston over a period of nearly thirty years:

	1930	*1957*
No. of factories	57	80
Labor force	1632	6310

In 1951 about 27 percent of Kingston's working population was engaged in manufacturing. This compares with 55 percent for Peterborough and 64 percent for Oshawa, both cities of similar size. Nevertheless, Kingston has many advantages as an industrial centre. What source of cheap electric power is available? Modern industries require vast amounts of water. How is this requirement easily satisfied at Kingston? Kingston's location in relation to markets is a very good one for many types of industry. Why is this so?

In 1960 a planning study of Kingston was completed. This study was made to show how the city can expand and develop in an orderly way in the future. Preservation of beautiful and historic buildings of the past is a form of conservation. Kingston contains some of the finest old buildings to be found in any Canadian city. Under the 1960 plan, most of these buildings will be preserved. Some old buildings of no historic importance will be torn down. New houses and shopping districts will be built according to a master plan. It is expected that most new houses and industries in the future will be located outside the city limits as there is little land for expansion within the city. What there is must be preserved for use by the hospitals, schools, and other institutions that will grow as Kingston grows.

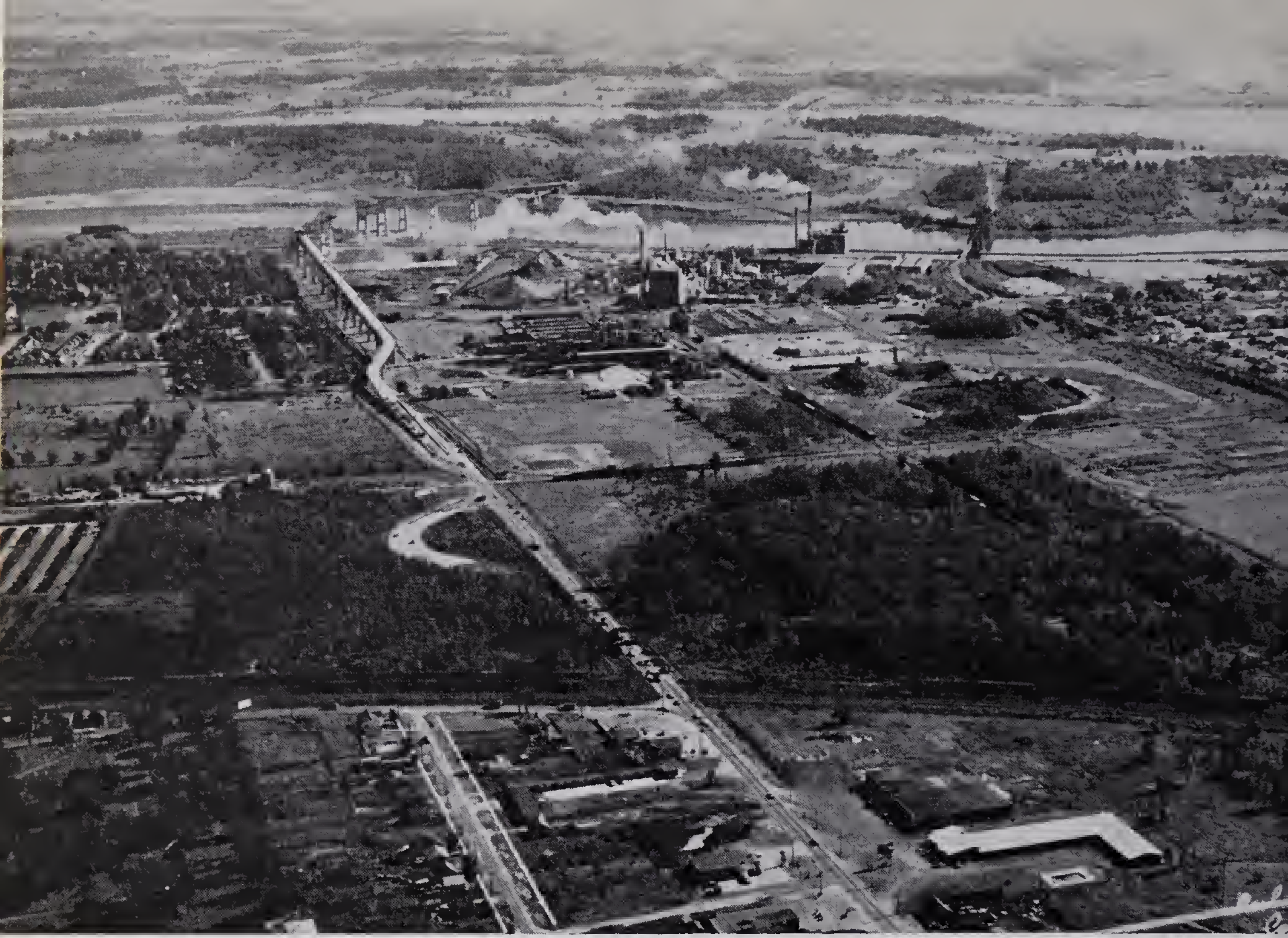
Traffic is a major problem in all modern cities. This is so, even in a fairly small city like Kingston. The 1960 planning study recommends the elimination of level railway crossings within the city. Roads carrying industrial traffic have been planned so that trucks and similar vehicles are kept away from the residential areas. Plans have been suggested to improve the appearance and facilities of the main shopping area. Off-street parking will be provided and a series of pleasant arcades and pedestrian walks will be constructed.

The Kingston waterfront will also be redeveloped. A marina may be built to accommodate the many pleasure boats that use the waters of the area. It has also been recommended that the railway yards and tracks be removed from the area near the city hall. Locate the city hall in Figure 2-61. By developing a waterfront park in front of it, one of the oldest and finest buildings of its kind in Canada will be open to view.

A summary of Kingston

1. What is the difference between **service** functions and **industrial** functions? Explain why service functions are so important at Kingston. Describe the city's industrial advantages.
2. Replanning the core areas of our old towns and cities is a task facing Canadians in many parts of the country. Describe the chief problems and purposes involved in planning the future development of Kingston.

The city of Cornwall, with a population of nearly 44,000 in 1961, is an important centre in Eastern Ontario. Figure 2-62 shows the western end of the city. Locate Cornwall on the map in Figure 2-2. Which river is visible in the distance? Which American state is located on the other side of this river? A great new international bridge connecting Canada and the United States is shown under construction in this photograph. Describe the location of the main Canadian National Railways line which is visible in this picture. To the right of the new bridge, on the bank of the river, is one of the largest pulp and



2—62 Industrial zone of western end of Cornwall (Carl Malcolm photo)

paper mills in Southern Ontario. What are the piles of material visible beside this mill? Immediately in front of it is an important chemical factory. Cornwall also has important factories manufacturing rayon and other textiles, as well as clothing and furniture. It is the headquarters of the St. Lawrence Seaway. Study Figure 2-7 and note the location of the Barnhart Powerhouse in relation to the city. The building of the Seaway has attracted new industry and population to Cornwall. Why is this so?

The site and surroundings of Ottawa, our national capital (Figure 2-60)

1. (a) What is the scale of this map? What fraction of an inch stands for one mile on this map?
(b) What is the area of the region shown on the map?
2. (a) Name three rivers that meet at the site of Ottawa.
(b) What evidence is there that these rivers are a source of water power?
3. (a) How many railway lines radiate from the city?
(b) How many major (numbered) roads radiate from the city?
(c) Which road would you take if you were travelling by car to Montreal? to Kingston? to Toronto? to North Bay?
(d) How many miles is Ottawa from Montreal and Toronto?

(e) Uplands is the site of the main airport at Ottawa. Describe its location.

(f) Describe how you would reach Ottawa by car, train, or plane from where you live.

4. Name the city located on the opposite shore of the Ottawa River. Many of the leading industries of the Ottawa region are located in this city. Describe the countryside on this side of the Ottawa River. In which province is this area located?

The word "Ottawa" is an Indian term meaning "a place of trade." As the junction of three rivers, it was a good meeting place of tribes. In 1613, Champlain became the first white man to visit the area. Later, it became the route of the voyageurs, and for centuries the fur trade dominated Ottawa's life.

The first real development of the Ottawa district began in 1799. In that year, Philemon Wright brought settlers from Massachusetts and established a settlement near Hull. In 1807, the first raft of *square timber*[*] was floated down the Ottawa. In 1808, settlement on the present site of Ottawa began. By 1832, a canal system had been developed to allow navigation along the Rideau River and lakes. This canal system is little used today.

Greater Ottawa now has a population of about 420,000. Since 1946, its development has been under the control of the Federal District Commission which is carrying out the National Capital Plan. This plan was drawn up by Jacques Greber, a famous French architect. It is designed to guide the development of the capital region during the coming decades. The Federal District Commission consists of 20 members, representing all provinces. It is appointed by the Federal Government. The Commission employs a staff of about 600 people.

Figure 2-63 is a map of the central section of the National Capital Region. What is the area of this section? This is less than one quarter of the area of the whole region, which covers about 1800 square miles. Only one third of this area lies in the Province of Ontario. Ottawa and Hull are only two of the 28 surrounding towns and cities that are part of the National Capital Region.

An important part of the National Capital Plan is to preserve large areas of parkland and open spaces. Study the Green Belt in Figure 2-63. How long is it? What is its average width? All building within the Belt is strictly controlled. About half the total area of 41,000 acres was purchased by the Federal District Commission. With the establishment of the Green Belt, the limits of the city of Ottawa have

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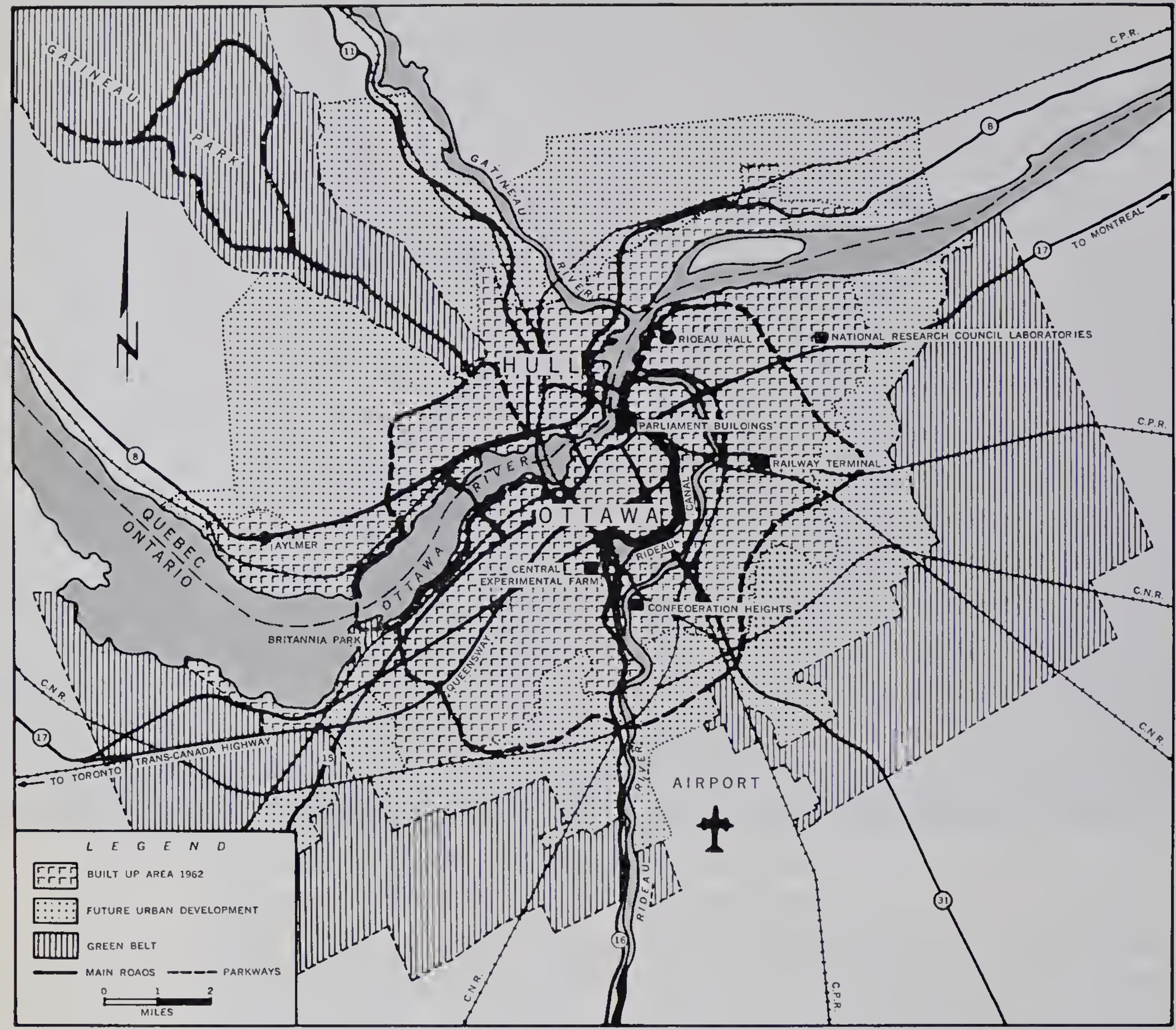
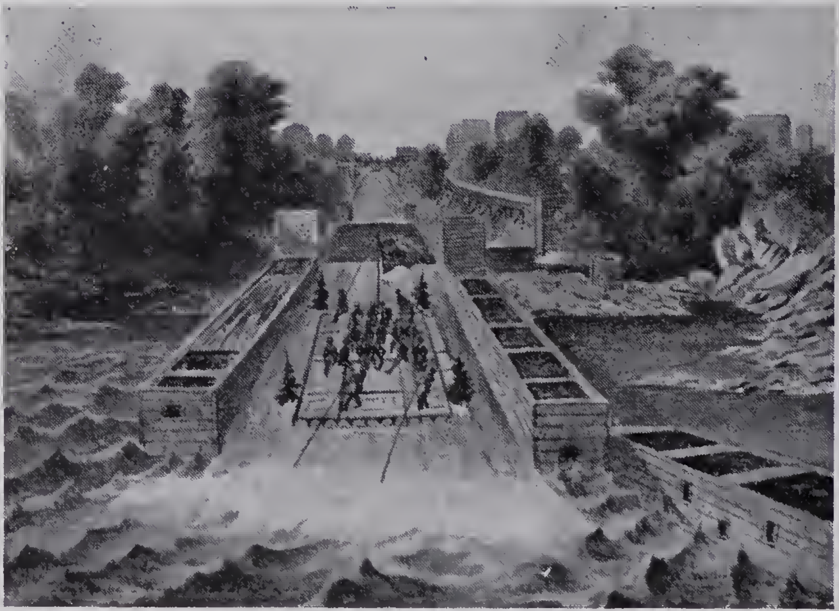
[*] Square timber consisted of logs squared off or hewn by axes. They were floated down the rivers by rafts or cribs which were held loosely together within a framework of logs. Floating the rafts past falls and rapids was difficult. Philemon Wright's son invented a timber slide which was used on the Ottawa River. Figure 2-64 shows the Prince of Wales riding down such a slide during his visit to Canada in 1859.



2—63 The central section of the National Capital Region

2—64 The Prince of Wales descending a timber slide on the Ottawa River in 1859 (Public Archives of Canada photo)



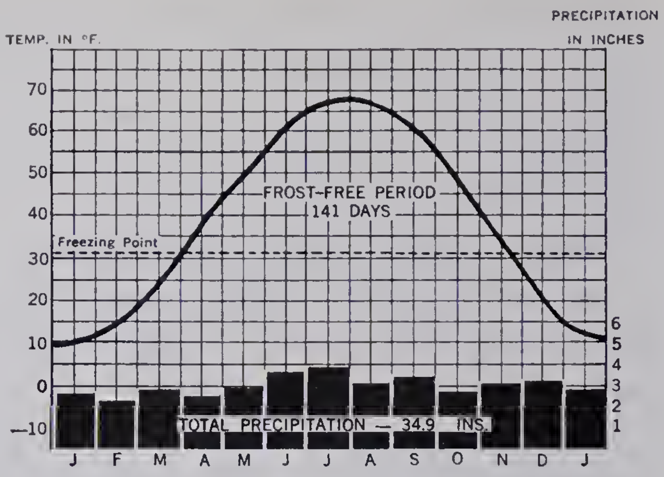
been firmly set. As the population expands, new, carefully planned towns will be established outside the Green Belt. A limited amount of land for future urban development is located between the present city limits and the Green Belt. Where else is a much larger amount of such land found?

Where is Gatineau Park located in Figure 2-63? This comprises 75 square miles of land used as a recreation area by the people of Ottawa, both winter and summer. Skiing and hiking trails, beaches, camping and picnic sites are a few features of this park.

In addition to Gatineau Park, the Federal District Commission has bought land along the Rideau and Ottawa rivers and along the old Rideau Canal. Many acres of parks and many miles of landscaped parkway have been created in this way. Within the city of Ottawa itself, 24 miles of parkway, lined in spring with millions of the city's famous tulips, have been built. In Figure 2-63, trace the route of a journey through Ottawa's parkway system from Rideau Hall, the residence of the Governor-General, around the city. Passenger cars only are permitted to use this route. Trace the route back to Rideau Hall via Britannia Park and Hull.

All highway entrances to Ottawa are strictly controlled by the Federal District Commission. No billboard advertising is permitted along these roads. Trace the route of the Queensway from the east to the west side of the city. This fine road occupies an old railway "right of way." Part of the National Capital Plan has been the removal of all but one railway line from the centre of Ottawa. A single passenger and freight terminal has been established for both major railways. Describe its location, according to Figure 2-63. All level crossings are gradually being removed from Ottawa. Another activity of the Federal District Commission has been the preservation of old historic buildings. Many of these have been purchased and are being restored.

The National Capital Plan has already earned recognition for Ottawa as one of the world's most attractive capital cities. As the plan develops, Ottawa will gradually become a city of which all Canadians can be proud. Its functions as a capital may be realized from the fact that one third of the working force of the area is employed by the Federal Government. Locate Confederation Heights in Figure 2-63. This is an area of new government buildings under construction. The National Gallery, the Public Archives, the National Library, two great national museums, the Dominion Observatory, and two important universities are other institutions located in Ottawa. These help to make the city a centre of education and culture for all Canada.



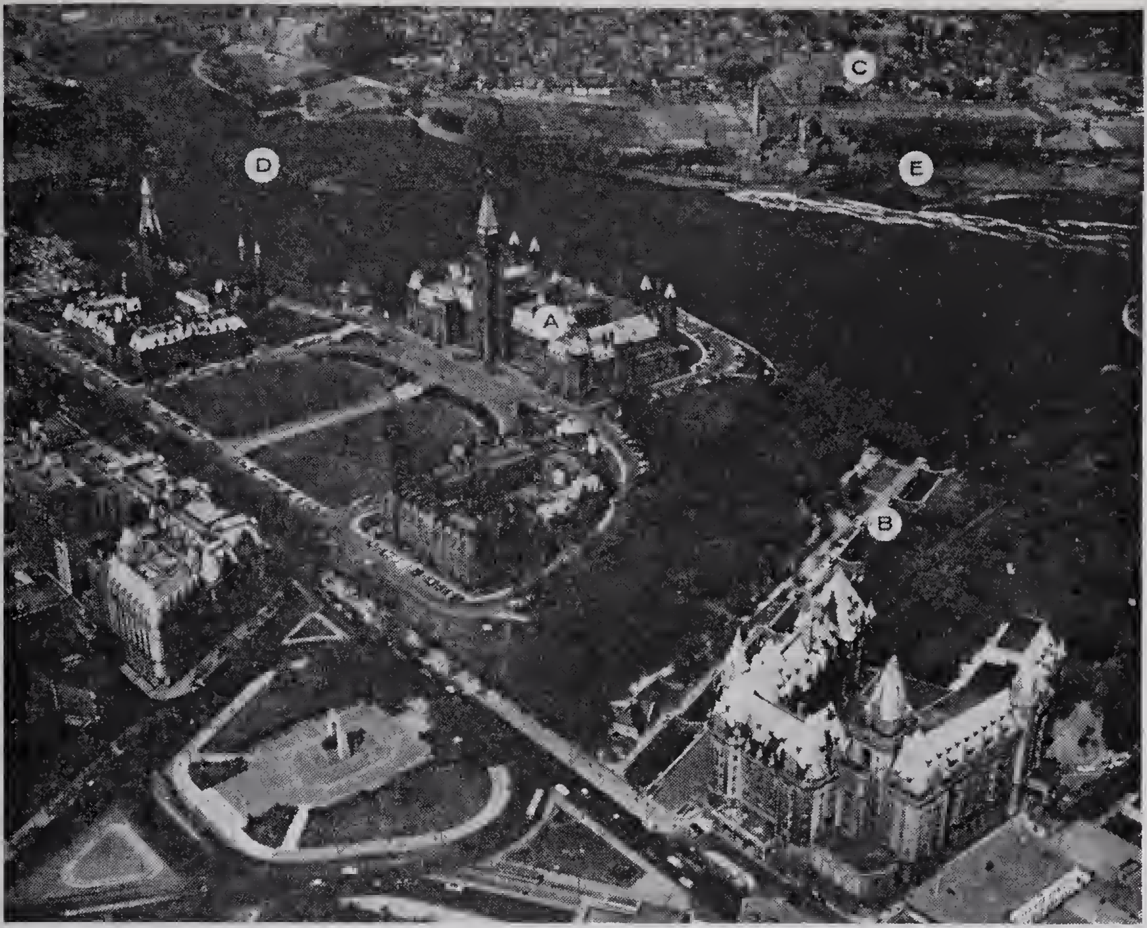
2—65 The climatic graph of Ottawa

Ottawa has developed an important tourist industry in recent years. Suggest reasons for this. The spring Tulip Festival attracts thousands of visitors.

Manufacturing activities centre around the rich coniferous forests and abundant hydro-electric power resources available from the Ottawa and Gatineau rivers. Lumber, paper, and matches are the most important industrial products of the Ottawa region. Printing and publishing, food processing, and the making of textiles and chemicals are other aspects of manufacturing.

The climate of Eastern Ontario differs fairly sharply from that found elsewhere in the southern part of the province. This is shown clearly in the climatic graph for Ottawa, in Figure 2-65. Compare winter conditions here with those at St. Catharines, which were studied in Figure 2-16. St. Catharines receives 38 inches of snow in an average winter. Ottawa receives 85 inches, or more than twice as much. Both cities have similar summers, but St. Catharines has a longer growing season, with 169 frost-free days. This compares with 141 frost-free days at Ottawa. The differences between these cities in winter conditions, total annual precipitation, annual snowfall, and growing season indicate interesting climatic differences between Eastern Ontario and the areas to the south and the west. Make a list of these differences. How might they help to explain the different type of farming in Eastern Ontario, compared with the Niagara Fruit Belt for example?

West of Ottawa lie several towns, including Renfrew and Pembroke. These were major Canadian timber centres many years ago. Lumbering is still of some importance in the neighborhood of each. Both towns function as service centres for the upper Ottawa Valley. At Chalk River, near Pembroke, is the headquarters of the Canadian atomic energy industry. Between Renfrew and Pembroke, the lowland



2—66 An aerial view of part of Ottawa and Hull (Canadian National Railways photo)

of Eastern Ontario gradually changes into the higher, rougher land of the Canadian Shield. The lakes, pine forests, rocky hills, and sandy soils belong to the quite different major region of Northern Ontario, to be studied in Chapter 3.

Ottawa — a review

1. Study Figure 2—66. Refer also to the maps in Figures 2—60 and 2—63.
(a) Which letters identify these features: Parliament Buildings; Ottawa River; Hull; Rideau Canal locks?
(b) What type of industrial enterprise is identified by "E"? Describe its location.
(c) The photograph was taken from the air. Was Rideau Hall visible to the right or to the left of the area shown in the picture?
2. Ottawa, like Kingston, has a much higher percentage of its working population engaged in service occupations than in manufacturing. Why is this so?
3. Why has Ottawa grown more slowly than Toronto?

Reviewing the Industrial Heartland

1. We have studied four regions of Southern Ontario: Niagara, South-Central Ontario, Southwestern Ontario, and Eastern Ontario. Listed below are five statements. Each describes or refers to one of the four regions. List numbers 1 to 5 in your notebook and beside each number write the name of the region described by the statement.

1. Orchards and suburban housing are competing for land.
2. Tobacco kilns, greenhouses, and sandy soils requiring much fertilizer are features of the landscape.
3. The largest power development on one site in Canada is located there.
4. This region includes Canada's leading area for the production of cheddar cheese.
5. The longest growing season of any part of Eastern Canada occurs there.

2. Listed below are 5 statements about the various cities of Southern Ontario. List the numbers 1 to 5 in your notebook and beside each number write the name of the city to which the statement applies.

1. This city produces one fifth of Canada's manufactured goods.
2. This city is located at the busiest international border crossing point in Canada.
3. This city manufactures more iron and steel than any other Canadian city.
4. This city handles more overseas cargo than any other Canadian port on the Great Lakes.
5. This city is an important producer of petro-chemicals and centre of Canada's synthetic rubber industry.

3. Give reasons why each of the following statements is true.

(a) Thermal power plants are being built in Southern Ontario, although the region produces vast quantities of hydro-electric power.

(b) The furniture industry remains important in Southern Ontario, although most of the hardwood forest has been removed.

(c) Despite the attractions of the suburbs, many industries are choosing to remain in the downtown areas of the large cities.

(d) Even in the chief manufacturing centres, the majority of workers are engaged in non-manufacturing enterprises.

(e) Historical rather than geographical factors may explain why an industry (such as automobile manufacturing at Oshawa) is located in one place instead of another.

4. The following statements describe conservation problems in Southern Ontario or describe efforts that are being made to conserve resources. In each case, name one place in Southern Ontario where the problem exists. State what steps are being taken (or have been taken) to deal with the problem in that place. Indicate the benefits to be gained from intelligent action to solve the problem.

(a) Special efforts are being made to preserve historic buildings in one of Ontario's oldest cities.

(b) Serious pollution exists in a river that flows through one of Ontario's largest cities.

(c) Land is being reclaimed to provide more harbor facilities in a great port.

(d) Sandy soils, once abandoned, are now producing the province's chief cash crop.

(e) Parks are being established to provide recreation and to educate people in the wise use of resources.

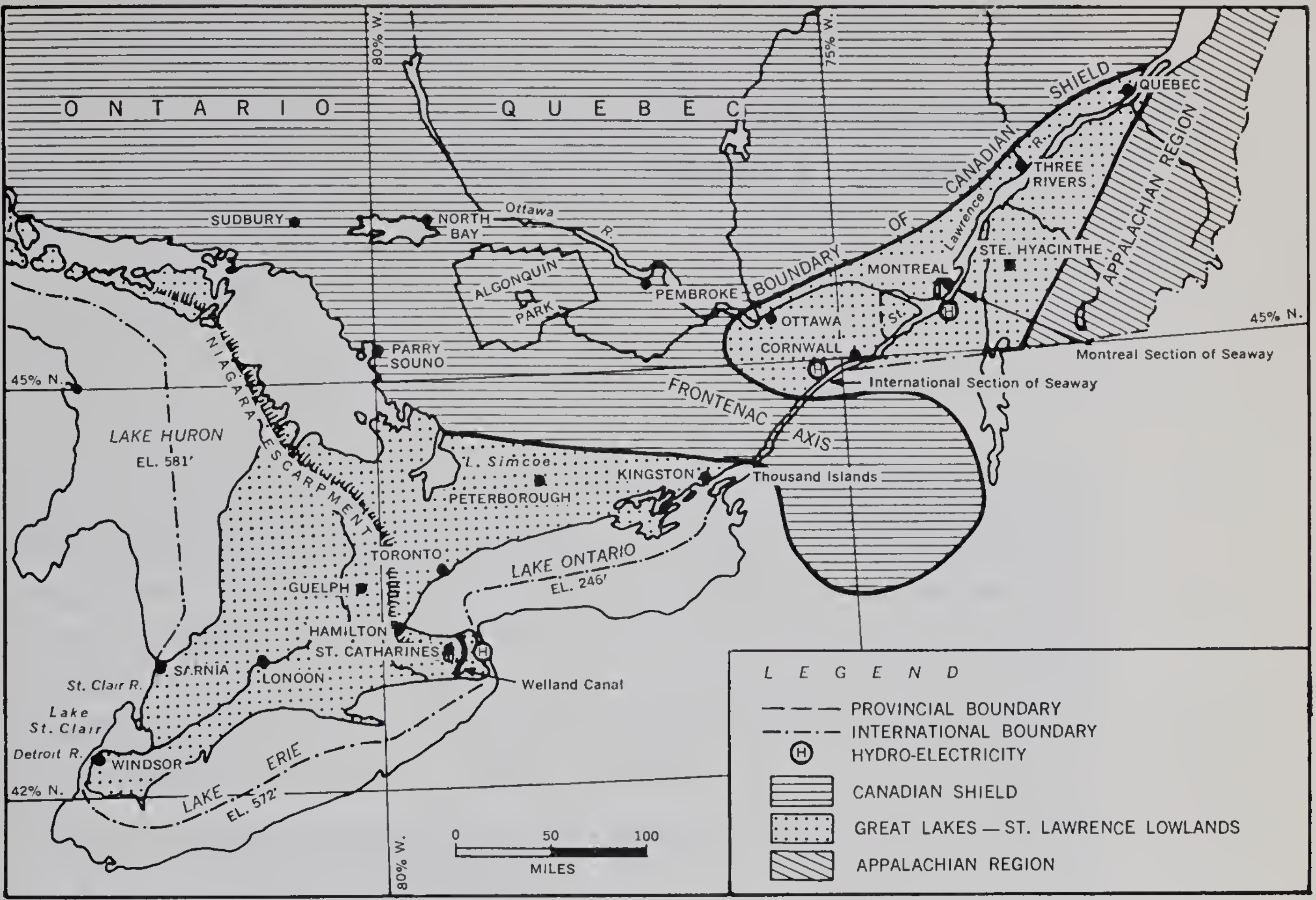
(f) Valuable orchard lands are being lost to housing and industry.

(g) Careful planning is restoring the heart of an old downtown area.

(h) Beautiful landscaped parklands have been established in the neighborhood of one of the world's greatest natural wonders.

(i) Long-range planning will give Canada one of the world's finest national capitals.

(j) Soil erosion by wind and water has threatened valuable farmland.



2—67 The major physical divisions of Southern Ontario and Quebec

5. Discuss answers to the questions posed at the beginning of this chapter on page 18.

6. Study Figure 2—67.

(a) Which region studied is entirely west of the Niagara Escarpment?

(b) Name the large island in Georgian Bay into which the Escarpment extends.

(c) What name is given to the Canadian Shield where it is crossed by the St. Lawrence River? Which picture in this chapter illustrates part of this feature?

(d) Name the three great hydro-electric developments of the Great Lakes-St. Lawrence Waterway that are shown on this map.

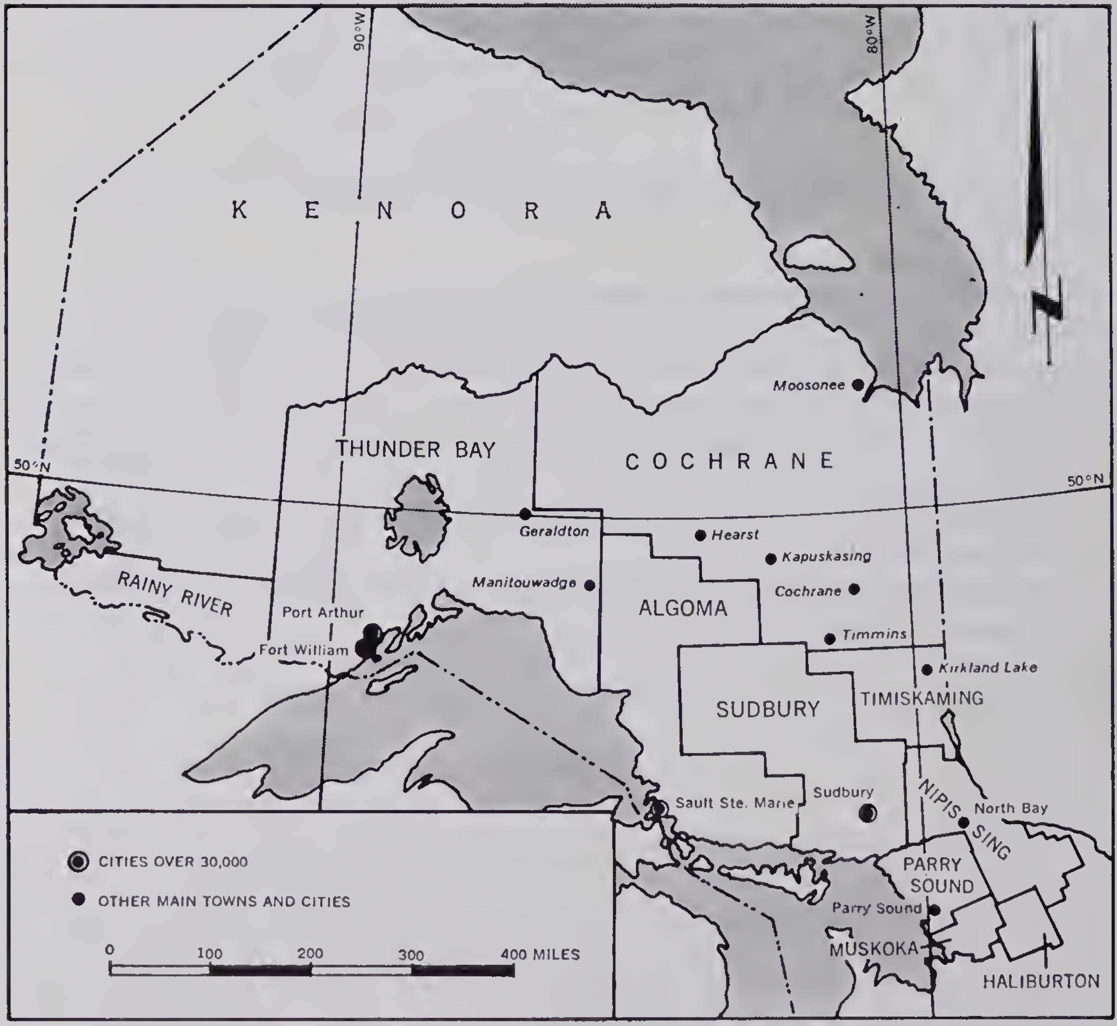
(e) Name all the rivers shown that flow into the Great Lakes-St. Lawrence-Ottawa system.

(f) What are the three great physical divisions of Eastern Canada that are referred to in the caption?

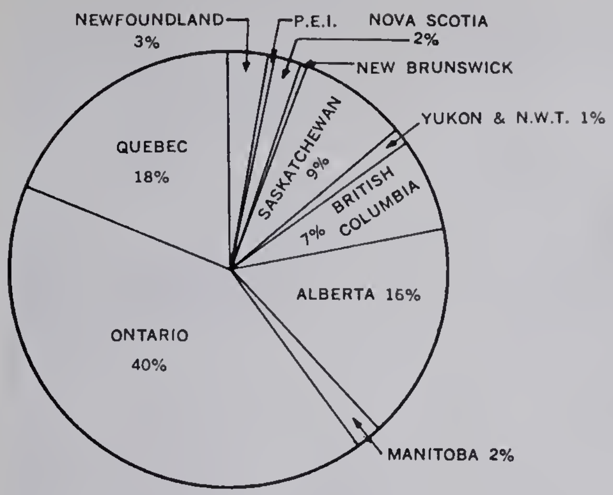
CHAPTER 3

Northern Ontario: Canadian Treasure House

The Canadian Shield extends very far into Southern Ontario, splitting that region into two parts, as we can see in Figure 2-67. The whole area within the triangle formed by Ottawa, Parry Sound, and North Bay is a *transition zone.* In other words, it is an area within which the features of two neighboring regions may be seen. Types of farming, ways of living, and good transportation links with Southern Ontario cause the area to resemble that region in some ways. Great forests,



3—1 The Districts of Northern Ontario



3—2 Percentage of Canadian mineral production by provinces, 1960

many small lakes, sawmills, power dams, and scattered farms give evidence of a quite different landscape. Algonquin Park, shown in Figure 2-67, is a wilderness, containing woods, lakes, and an amazing variety of wild life, many of the features often associated with Northern Ontario. It is the largest wilderness easily reached from Toronto, Algonquin Park exceeds Prince Edward Island in size and is one of many tourist areas of Northern Ontario.

Figure 3-1 divides Northern Ontario into districts instead of counties. How many districts comprise the region? Most of these are very large. The District of Kenora, for example, could easily contain the whole of Southern Ontario plus the three Maritime Provinces and the island of Newfoundland. Name the four largest cities of Northern Ontario. Sudbury is the largest of these. Including surrounding towns, it had a population of about 110,000 in 1961.

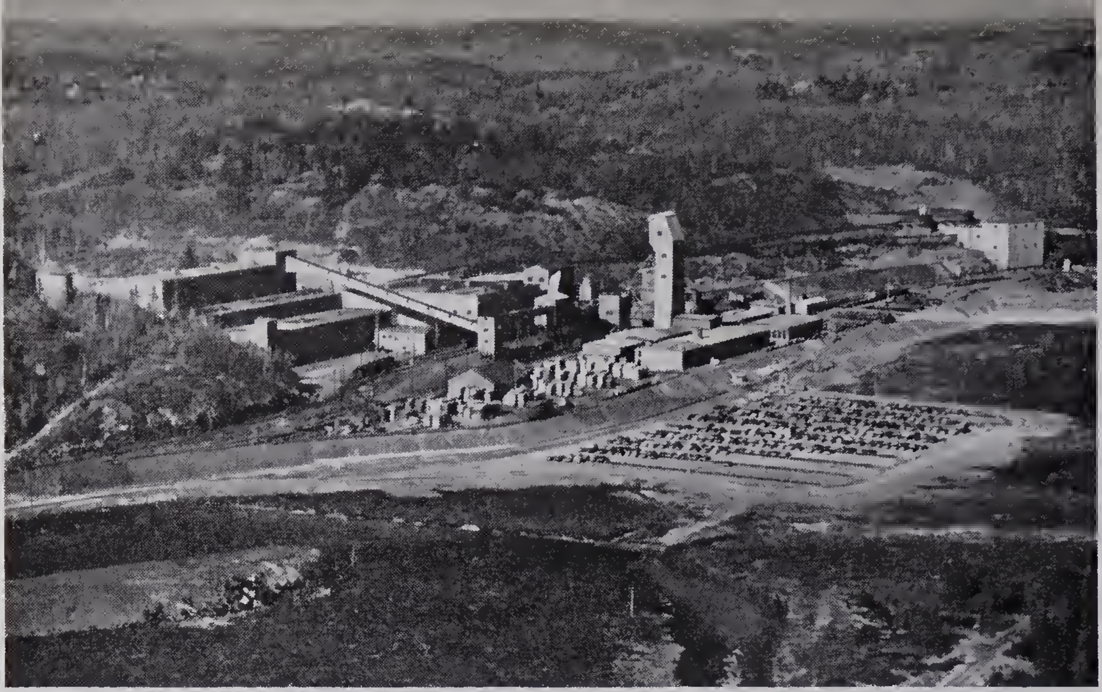
> Why are there so few towns and cities in Northern Ontario and why is most of the region an empty land?
>
> Why is "Canadian Treasure House" a good name for the region?

These are the important questions to ask (and to answer) in a study of Northern Ontario.

Figure 3-2 provides figures on mineral production in Canada in 1960. What percentage of the total value of Canadian mineral output was produced in Ontario? Compare this percentage with the combined percentage for the next two ranking provinces. Nearly all of the vast Ontario output was concentrated in Northern Ontario. Which minerals account for most of the output? Where are they processed and marketed? These are further questions to be answered in this chapter.

MINING IN NORTHERN ONTARIO

Figure 3-3 shows a typical scene in or near many settled areas of Northern Ontario. This nickel mine is located west of Sudbury in the centre of the richest single mining area in all Canada. Within 50 miles

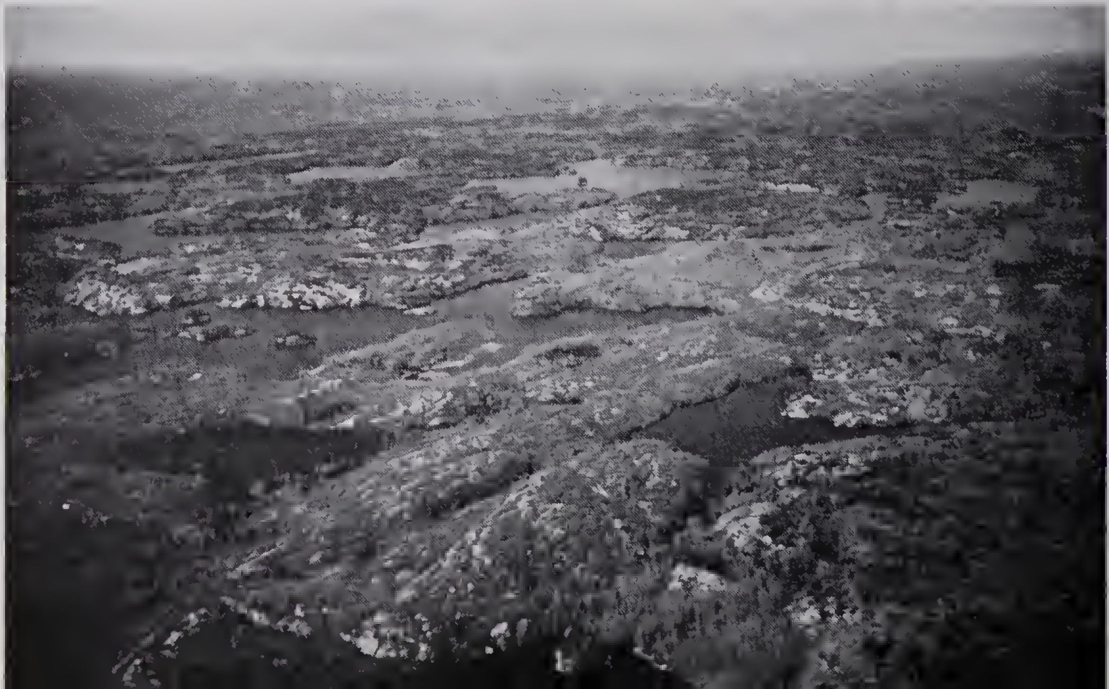


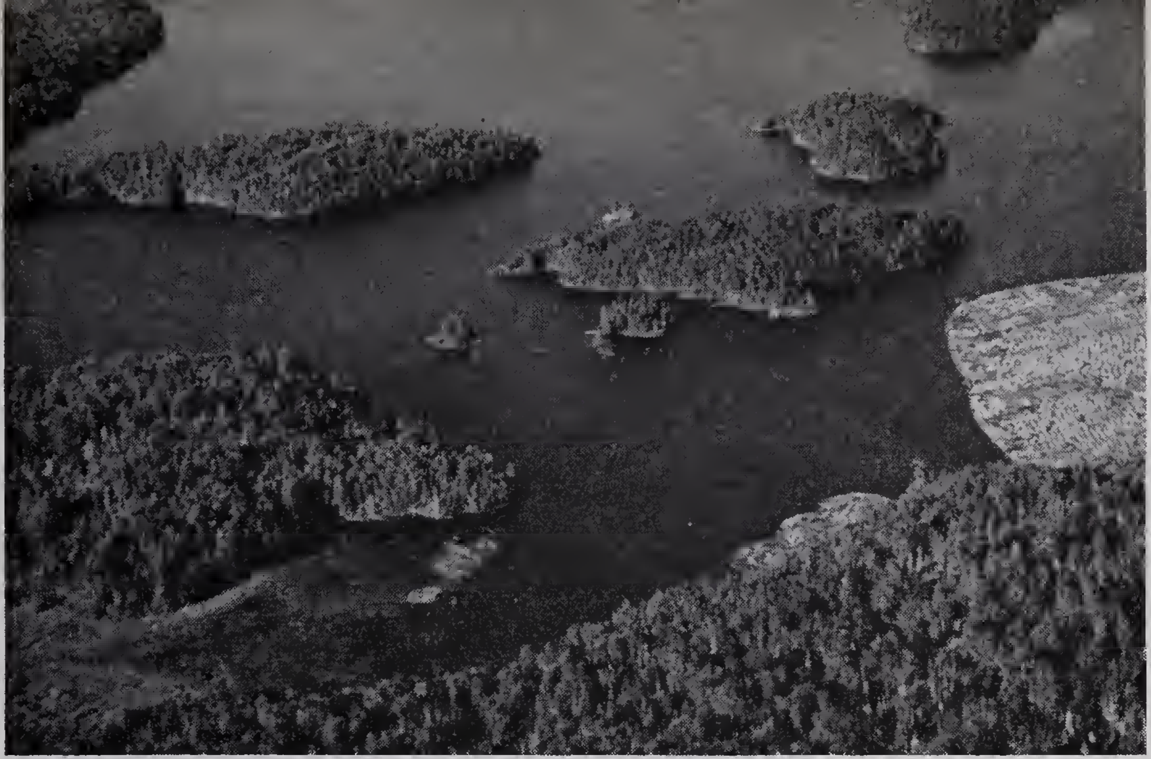
3—3 Aerial view of the Levack nickel mine near Sudbury (George Hunter photo)

of Sudbury, nearly half of Ontario's (and about one fifth of Canada's) vast output of mineral wealth is produced. Near the centre of the photograph in Figure 3-3 is a tall structure. This *headframe* is a familiar sight at most Ontario mines. It houses the hoists used to transport men, materials, and equipment deep underground. To the left of the headframe is the crushing mill where nickel, copper, and other ores are crushed before being smelted.

Study the background of Figure 3-3. Describe the relief of this land. Why would farming be unprofitable? The landscape shown is typical of vast areas of the Canadian Shield in Northern Ontario and elsewhere. Usually, there are many lakes as well as low hills, bare rocks, and forests. Figure 3-4 shows the landscape near Kenora, many hundreds of miles west of Sudbury. Describe the features of this

3—4 Typical Canadian Shield landscape near Kenora (Ontario Department of Lands and Forests photo)





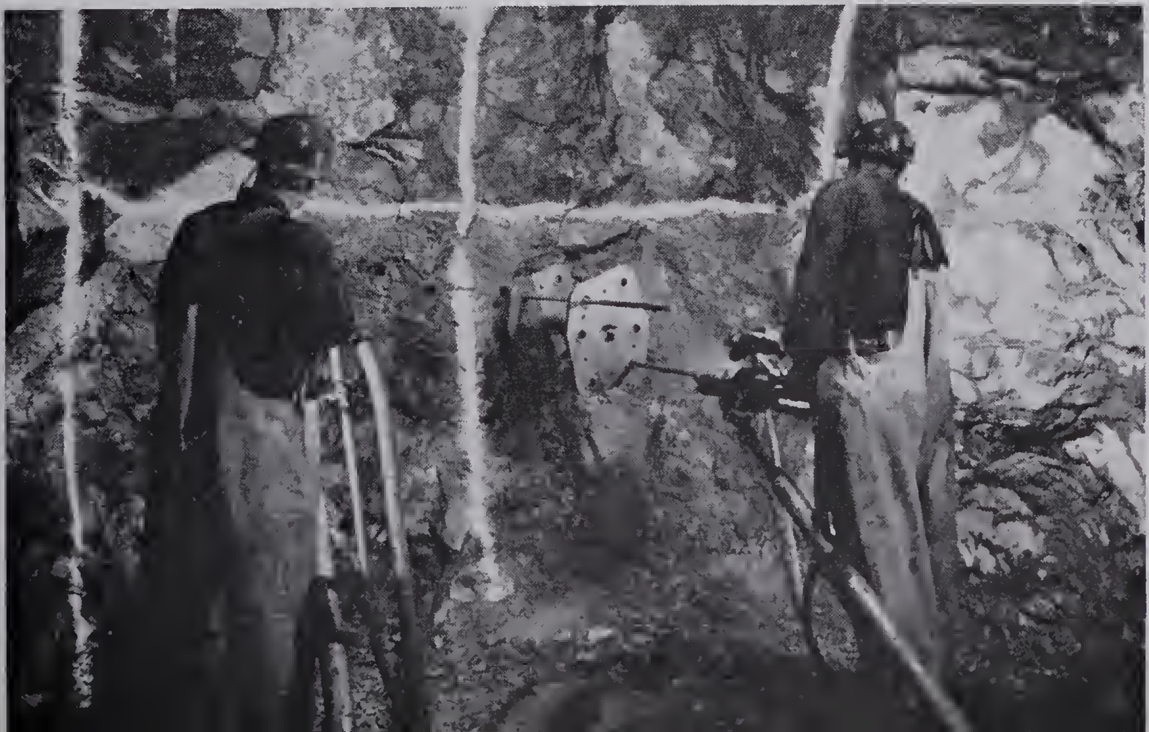
3—5 Lake of the Woods showing another typical aspect of the Canadian Shield landscape (Ontario Department of Travel and Publicity photo)

landscape. In the same district, the shores and islands of Lake of the Woods support dense forests, as shown in Figure 3-5. Such forests are another characteristic of the Canadian Shield. What is the nature of this forest? What use is made of it?

Figure 3-6 shows miners at work underground in the mine illustrated in Figure 3-3. These men are drilling holes in the solid rock. Explosives will be placed in these holes and the rock face will be blasted, loosening the ore, which will then be ready for transport to the surface. The various mines at Sudbury contain more than 400 miles of underground railways such as that shown in Figure 3-7. Notice the large chunks of ore in the car behind the locomotive.

Figure 3-8 is a picture of one of the largest smelters in the world. It is located at Copper Cliff and is one of several in the Sudbury

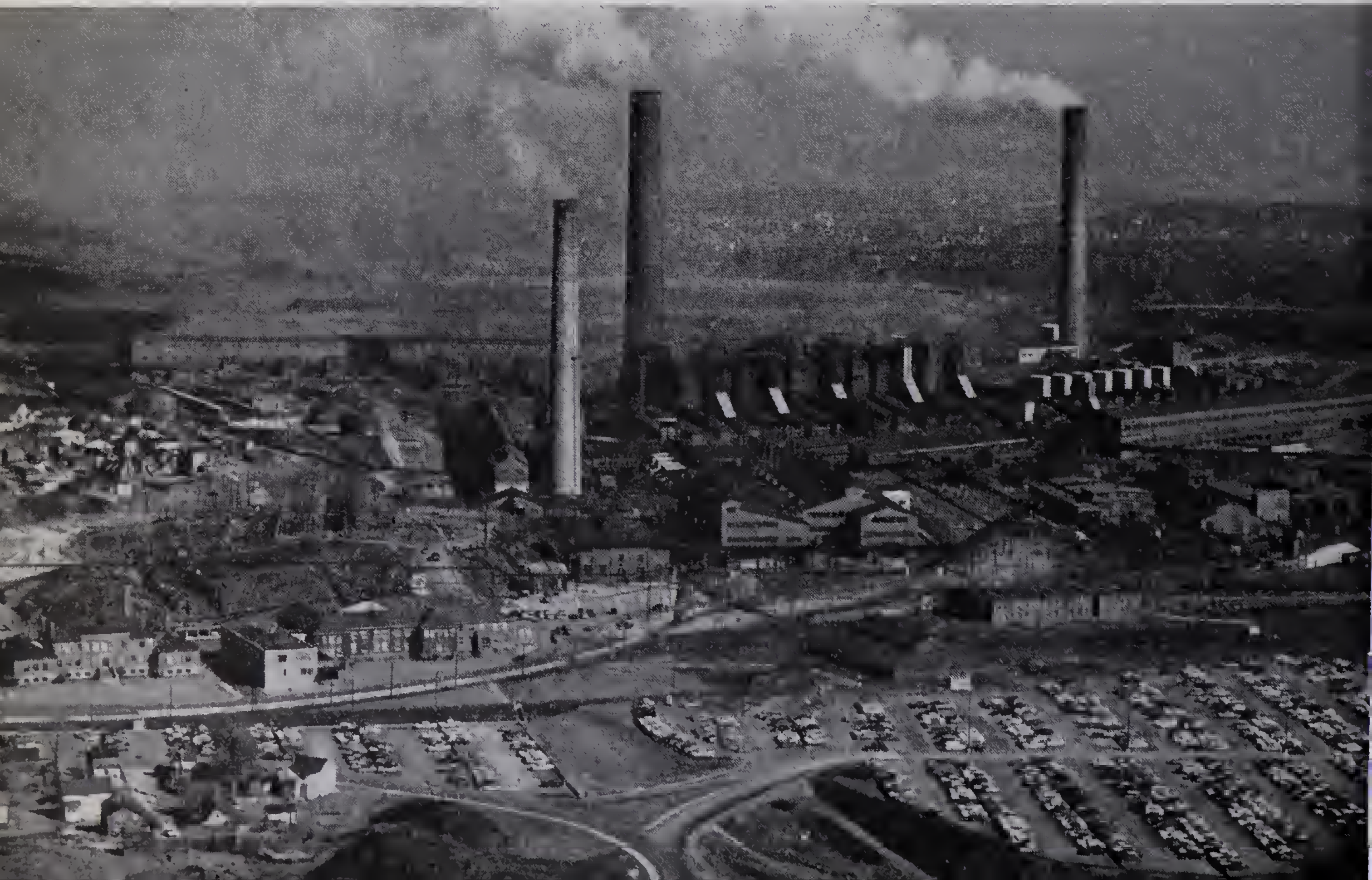
3—6 At work underground in mine near Sudbury (George Hunter photo)



3—7 An underground railway in a nickel mine at Sudbury (International Nickel Company Limited photo)

district. Some of the dark-colored hills behind the smokestacks are *slag heaps,* or piles of waste material produced by the smelting process. *Smelting* refers to the separation of the metal from the rock that contains it. Great furnaces, usually heated by electricity, melt the metal so that it can be drained off and collected in moulds. From the smelter, the metal is sent elsewhere for further refining and for manufacture into sheets, tubes, wire, and other forms from which various products can be made.

3—8 One of the world's largest smelters is at Copper Cliff near Sudbury (George Hunter photo)



The Sudbury mines produce more than half the world's supply of nickel. They also produce one third of all copper mined in Canada and about one third of the world output of platinum. Some silver and various other rare metals are also mined. Since 1956, it has become profitable to extract iron from the ores and about 1,000,000 tons of this are now being produced annually. The Sudbury ores are very complex. Most rocks contain several of the metals that have been named. A particular ore is named from the metal that occurs in greatest quantity in that ore. Thus, a copper ore includes copper as its chief metal, but usually also contains several other metals.

The mining industry has done much to change the landscape of the Sudbury district. Until 1850, Northern Ontario was the domain of the fur trader. As early as 1615, Samuel de Champlain reached Lake Nipissing. The Indians and the *voyageurs** used birchbark canoes for transportation. This craft served for three centuries as the chief means of exploration of the Canadian Shield. Light, swift, easily manoeuvred, and easily carried past the many rapids, waterfalls, and other barriers, it was well suited to travel in such difficult country. The route used by Champlain, by which he reached Lake Nipissing, Georgian Bay, and the country near Sudbury is shown in Figure 4-3. No less than 36 *portages*** were necessary on this route. The fur traders blazed the first trails, drew the first maps, and established the first tiny settlements in the Canadian Shield. One such settlement was Mattawa, on the Ottawa River, founded in 1784.

After the fur traders and the voyageurs came the lumberjacks and, later, the prospectors. By 1850, the first road had been built to Lake Nipissing. In 1853, the first discovery of mineralized rocks was made in the Sudbury district. The Indians had long used copper for making weapons and tools. They heated the rocks and broke them up to obtain the metal by pouring cold water on them.

The building of the Canadian Pacific Railway led to the first important development at Sudbury. The railway reached North Bay in 1882 and was extended to Sudbury a year later. During construction, rocks bearing copper and nickel were discovered. At that time, no use was known for nickel. As it was difficult and expensive to separate the copper from the nickel, the ore discoveries created only mild interest at first.

As a centre of railway construction, Sudbury had a population of 1500 in 1883. After 1883, only 300 people remained. But Sudbury was an example of how settlements grew up at railway construction sites. (The story was to be repeated many times on the Prairies.) In 1887, a townsite was surveyed. At this time, the first attempt to smelt the copper ore was made. A railway connection with Toronto was also established.

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*The *voyageurs* were mainly French Canadians who undertook the transportation of furs by canoe, from the Indians to the traders or merchants.

**Portages were land routes over which canoes and equipment could be carried past waterfalls and rapids.

Prosperity finally came to Sudbury after 1900 when uses for nickel, and methods of smelting and refining it, were discovered. Alloyed with steel, it produced an extra-hard steel having many modern uses. These included, for example, the hard steel needed in huge cannon and naval guns. Alloyed with aluminum, it strengthened that light metal. Nickel was also alloyed with other metals such as copper and bronze.

Much of the nickel mined at Sudbury is shipped to Port Colborne on Lake Erie for refining. Vast quantities are also exported to the United States, which is the chief market for most of the metals produced in the district.

In the early days, wood was used as a fuel in smelting. This removed much of the forest cover and reduced the natural vegetation to the rather scrubby type visible in Figure 3-3. Equally destructive of the forest have been the fumes from the modern smelters, such as that visible in Figure 3-8. The destruction of the forest has caused widespread soil erosion. Much of the landscape around Sudbury consists of bare rock with stunted or dead trees. Slag heaps around the smelters are further evidence of man's influence on the landscape.

Fortunately, efforts are now being made to halt the destruction of the forests and the soil. There are beautiful lakes and forests near Sudbury and an important tourist trade has developed. The Sudbury Basin (around the edges of which the metal ores are found) contains good farmland. About 500 farms now dot the basin and make a notable contribution, mainly in the form of dairy produce, to the food supply of the district.

Copper Cliff, Garson, Coniston, and Falconbridge are other towns included in the metropolitan region of Sudbury. Plentiful cheap hydro-electric power is available to the mines, smelters, and homes. No place in Northern Ontario lacks hydro-electricity, because the Canadian Shield is the world's greatest storehouse of water power.

The ore-bearing rocks around Sudbury contain a great variety of minerals. Name those already mentioned. The rocks of Northern Ontario, such as granite, are among the oldest in the world. These rocks are *igneous* in character, which means that they originated in the hot, molten material below the surface of the earth. During millions of years, they cooled and hardened. Igneous rocks must be distinguished from *stratified* or *sedimentary* rocks that consist of layers or *strata,* laid down on the ocean floor or in ancient lakebeds. Sedimentary rocks may contain such minerals as coal, oil, and salt, but not metals. The latter are found only in areas of igneous rock or where tremendous heat, pressure, and other forces have changed the composition and structure of the strata. Such changed formations are called *metamorphic* rocks. "Metamorphic" comes from two Greek words meaning "changed in form."

The Canadian Shield of Northern Ontario is one of the world's largest regions of ancient igneous and metamorphic rocks, and is a huge treasure house, containing a great variety and quantity of minerals.

Locate Blind River and Elliott Lake in Figure 3-9. In 1954 the mining of one of the world's greatest uranium deposits began in this area. Most of the output has been exported to the United States and Great Britain, although some has been used as a source of fuel for experimental nuclear power stations and for other purposes in Canada. However, the United States and Great Britain have greatly reduced their purchases of Canadian uranium. As a result, several mines at Elliott Lake have closed down and many people have left. The story of the "boom" town where the ores were quickly exhausted or where, as in this case, the market declined, is an old one in the history of Canadian mining.

North of the Sudbury district is the other great mining belt of Northern Ontario. This is often called the Clay Belt, although some geographers, with equal justice, have called it the Gold Belt. Here is the greatest gold-producing region of the Western Hemisphere—one that ranks in importance with any in the world.

Figure 3-9 shows that there are really two Clay Belts, each like an island, surrounded by the ancient hard rocks of the Canadian Shield. The clay was deposited on the bed of an ancient lake that existed towards the close of the last Ice Age, at the same time that Lake Iroquois occupied the sites of Hamilton and Toronto. This huge lake was probably formed as the retreating ice blocked the normal drainage of streams into Hudson and James bays. In addition to clay, there are large deposits of peat and of glacial materials that form drumlins and *eskers.*[*] The Clay Belt extends into Northwestern Quebec which is the chief mining region of that province.

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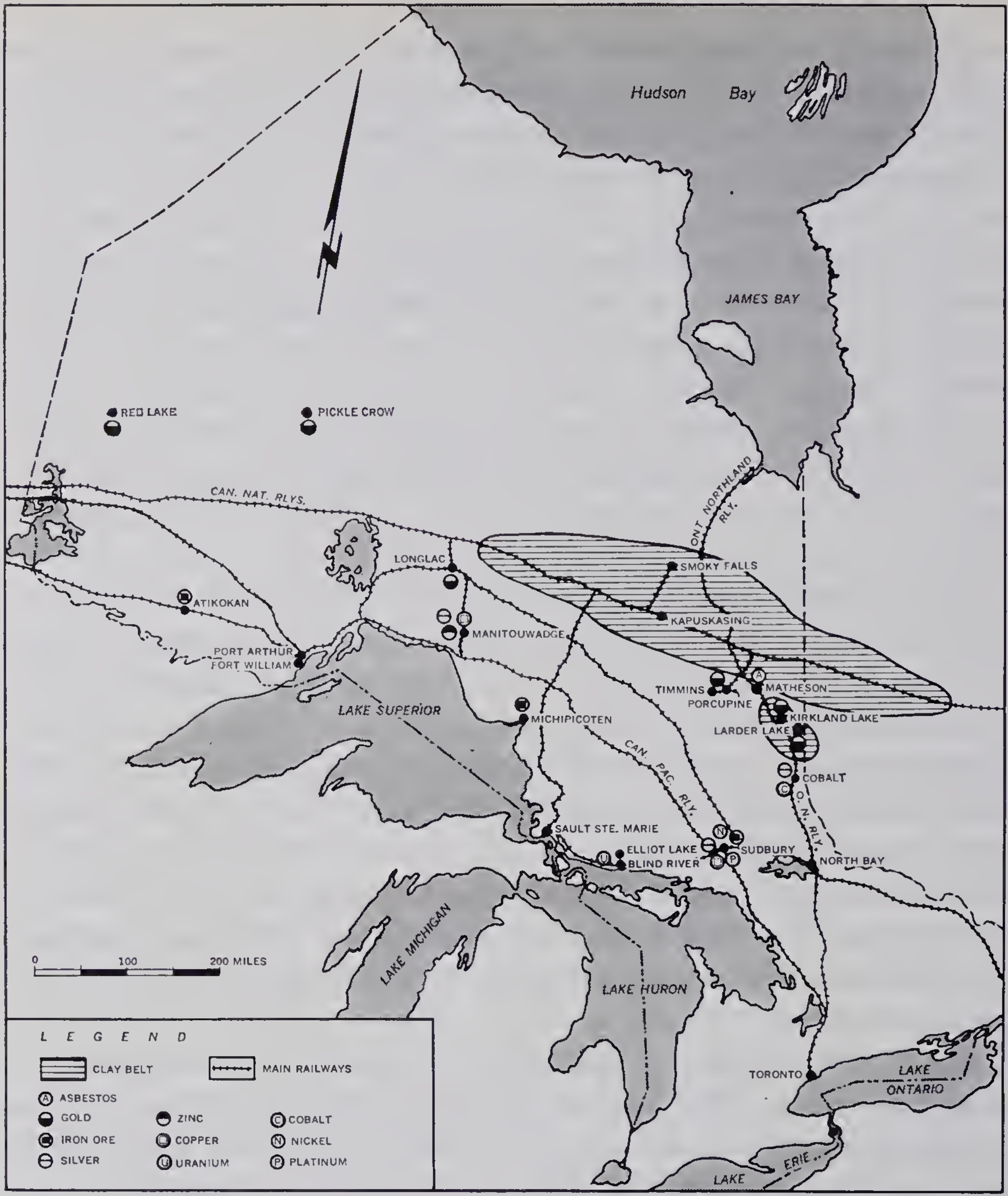
[*] An esker is a glacial deposit of sand and gravel, found in the form of a long, narrow ridge. Eskers are thought to be deposits left by streams flowing inside glaciers.



3—9 Leading minerals of Northern Ontario

By 1856, nearly all farmland in Southern Ontario had been occupied. Roads, and later railways, were built into the Clay Belt during the next half century, and farmers entered the region with the first lumberjacks. It was thus the lure of farmlands, not of minerals, that first brought large numbers of settlers to the region. Few dreamed that in the hard rocks that underlie the old lakebed, was a rich storehouse of metals. Its farms and rich forests give the region an appearance (as seen in Figure 3-13) quite different from that of the rest of the Canadian Shield.

Mining in the Clay Belt began in 1903 at Cobalt. Here, silver assayed at 6000 ounces to the ton, when the metal was worth 76 cents per ounce. How much was a ton of Cobalt silver ore worth in 1903? Cobalt, a metal used as an alloy in making certain types of steel, was also mined there for many years. Production went into decline for awhile but revived recently as a result of the demand for cobalt in the manufacture of jet aircraft engines. The area is still Ontario's chief producer of silver.

Great gold "strikes" were made at Porcupine in 1909, at Kirkland Lake in 1912, and at Larder Lake in 1913. Locate these centres in Figure 3-9. All have been in production for 50 years or more and still account for more than half of Canada's gold output.

Railways were vital to the opening of the Northern Ontario mining country. Notice the course of the Canadian National Railways through the Clay Belt, in Figure 3-9. How has it influenced the location of the towns? Trace the course of the Ontario Northland Railway in Figure 3-9. This line was built during the period 1902-5 and gave the region its vital link with Toronto. That city is the headquarters of many of the leading mining companies. The Toronto stock exchange trades more mining shares than any other in the world.

The largest city of the gold mining region under discussion is Timmins, on the southern edge of the Clay Belt. Founded in 1911, Timmins had more than 29,000 people in 1961. However, this represented only a slight increase over a period of 20 years. Eleven gold mines, including the famous Hollinger, one of the largest in the world, employ 6000 people. At Kirkland Lake, the trend of population has been as follows:

1932	13,000
1939	25,000
1960	18,000

The recent slow growth of Timmins and the declining population of Kirkland Lake are in marked contrast to the rapid growth of the cities of Southern Ontario and most other parts of Canada. On the other hand, Timmins and Kirkland Lake increased rapidly in population during the period 1930-40 when most Canadian towns were growing slowly. These trends are related to the unusual nature of the gold mining industry.

Most Clay Belt gold is sold to the United States Treasury. In 1934, the Treasury raised the price of gold from $26 per ounce to the present price of $35 per ounce. As a result, the gold mining communities experienced a boom. Indeed, Timmins and Kirkland Lake were quite prosperous in 1935 when other Canadian towns had severe unemployment.

However, during and after World War II, the cost of mining gold greatly increased, as miners' wages and the cost of equipment, transportation, and processing increased. Some mines were forced to close down. To improve the situation, the Canadian Government agreed in 1948 to pay a *subsidy* of $7.50 per ounce. This action was taken because the United States price remained at $35.00 per ounce. Without the subsidy, the cost of producing an ounce of gold exceeded the selling price.[*] For a time, the mining communities had another, mild boom. However, increasing costs are creating a problem again and the future of these communities remains uncertain. They must depend on a single product but have no control over either the pricing or the marketing of that product. Moreover, gold is a diminishing resource, as the supply of ores is reduced each year. Cities such as Timmins are making great efforts to attract new industries. Some logging and lumber processing is carried on in the neighborhood of the gold cities. There is abundant hydro-electric power. The Blind River uranium deposits provide hope that the whole of Northern Ontario may benefit from industries based on nuclear power.

Locate three other important gold areas of Northern Ontario in Figure 3-9. That at Long Lac has declined in importance, with only two mines operating, where once there were 12. Pickle Crow is an example of a small remote community entirely dependent on a gold mine. Of its population of 750, about 200 are employed as miners. Six gold mines operate in the Red Lake district. This town, with a population of 1800, is a tourist and fishing centre.

Several major iron mining centres exist in Northern Ontario. The three most important are shown in Figure 3-9. That at Sudbury has already been mentioned. The Michipicoten ores supply the steel mills at Sault Ste. Marie. The largest iron ore producer in Northern Ontario (and second only to Labrador in Canada) is located near Atikokan. The ore is mined at Steep Rock Lake. Figure 3-10 shows how mining here is carried on by *open-pit* methods. These contrast with shaft or underground mining of the type shown in Figure 3-3. At Steep Rock Lake, it was necessary to build a dam and to install pumping equipment to drain the water from the lake. Clay, mud, gravel, and other overburden were also removed from the bed of the lake. The steam shovels and trucks in Figure 3-10 are at work on the bed of the old lake. The ore is shovelled directly into the trucks and then carried to Atikokan for rail transport to the Lakehead (Fort William and Port Arthur). There it is loaded on to giant "lakers" and carried to Hamilton and various steel centres in the United States. Atikokan is an example of a modern planned community in the Canadian Shield of Northern

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[*] A ton of gold ore at Larder Lake yields only one-fifth of an ounce of gold (seven dollars' worth, at the present world price).

3—10 Mining iron ore on the bed of former Steep Rock Lake near Atikokan (Ontario Department of Travel and Publicity photo)

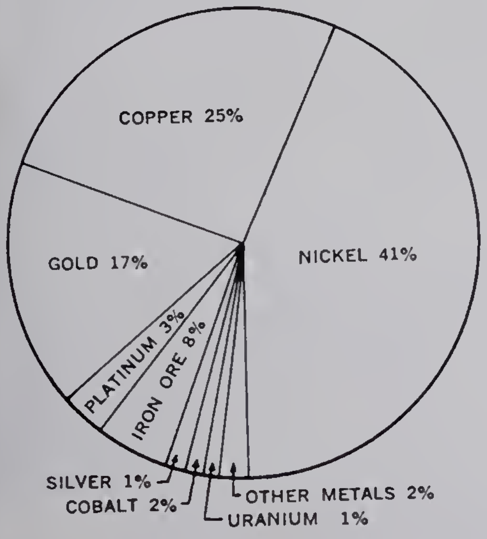
Ontario. Timber is another natural resource of the area around Atikokan.

The Steep Rock iron ores are among the richest ever discovered. They assay at 65 percent, which means that 65 percent of a ton of ore is more or less pure iron. At present, the deposit yields 5,000,000 tons of ore per year, but it is planned to double this output.

Manitouwadge, another modern mining community, began development in 1954. Locate it in Figure 3-9. This is the site of one of the most important copper deposits discovered in Canada in recent years. What other mineral is also produced there? The "shack towns" of earlier mining days are no longer being built. The houses under construction in this town could be found in any suburban area of Southern Ontario.

A review of mining in Northern Ontario

1. (a) Name one place in Northern Ontario where each of the eight metals indicated in Figure 3-11 is mined. Name one use made of each metal.



3—11 Percentage of Ontario's total metal production by value accounted for by each metal named

(b) Which is the most important metal by value? About what fraction of total metal production is accounted for by nickel and copper combined?
(c) How important is gold in comparison with the other metals?
(d) What is the most important metal next to gold?
2. Why is North Bay said to be located in a transition zone?
3. Distinguish between open-pit and underground mining. Name one mineral and one place in Northern Ontario where each method is used.
4. In what ways has mining changed the appearance of the original landscape in parts of Northern Ontario (for example Sudbury)? What serious conservation problems have developed as a result of mining?
5. In what ways does the appearance of the Clay Belt differ from that of the surrounding Shield country? Compare Figures 3—3 and 3—13 in answering this question.
6. Discuss some of the problems faced by a gold mining community such as Kirkland Lake.

FOREST INDUSTRIES OF NORTHERN ONTARIO

Next to mining, forest industries contribute most to the wealth of Northern Ontario. Although vast areas consist of lake and bare rock, or material called *muskeg,*[*] some of Canada's greatest forests are also found in this region. Forest industries include logging (or lumbering), sawmilling, and the manufacture of pulp and paper.

All aspects of the forest industries may be seen at or near Kapuskasing, which can be located in Figure 3-17.

Kapuskasing began in 1914 as a tiny settlement on the present Canadian National Railways transcontinental line. It was used as a camp for German prisoners during World War I. After 1918, an experimental farm was established there. Work done on this farm has revealed much about the agricultural possibilities of the Clay Belt.

The main industry at Kapuskasing is shown in Figure 3-12. This shows the mill of the Spruce Falls Power and Paper Company, located on the Kapuskasing River.

Why is Kapuskasing an important centre of Northern Ontario?

1. Pulpwood is the main raw material used by the mill.
(a) How many piles of pulpwood are there to the left of the mill?
(b) How is the product of the mill transported to market?
(c) The Kapuskasing Experimental Farm appears on the opposite bank of the Kapuskasing River. What evidence is there that this land is not in its natural state?
(d) When this photograph was taken, the camera was pointing almost directly west. From what direction was the wind blowing?
2. Study Figure 3—13 which is an aerial view of Kapuskasing and part of its hinterland.

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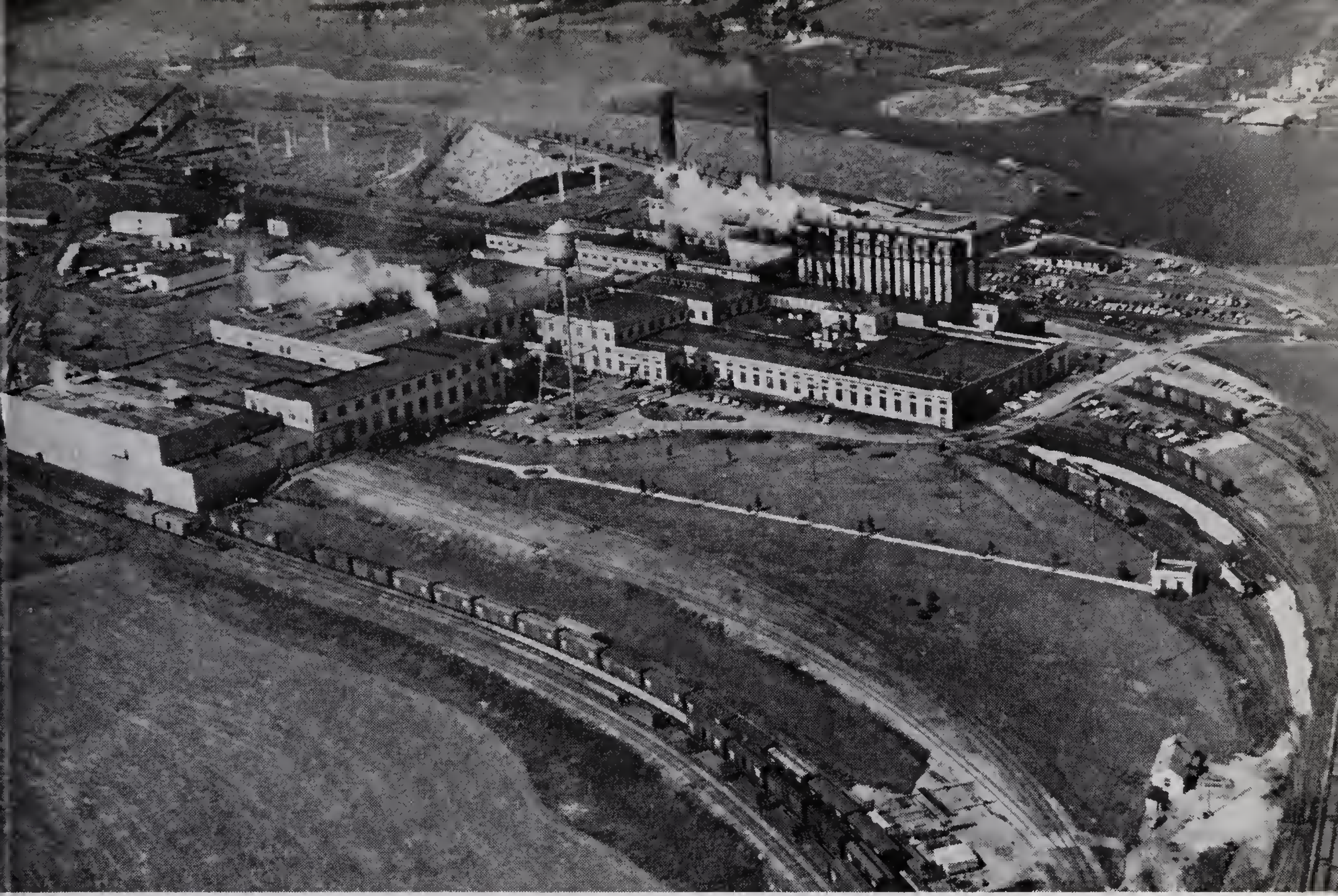
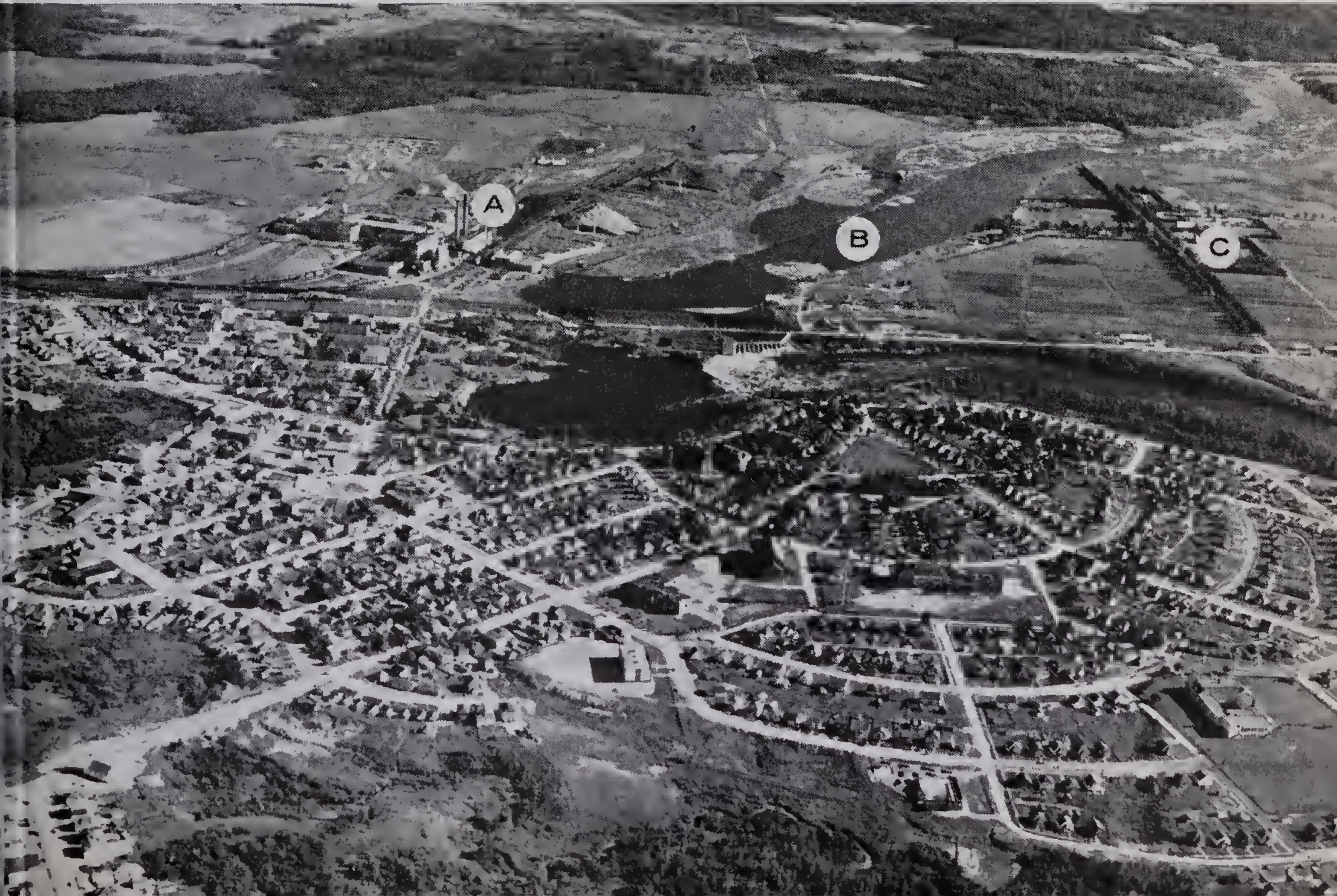
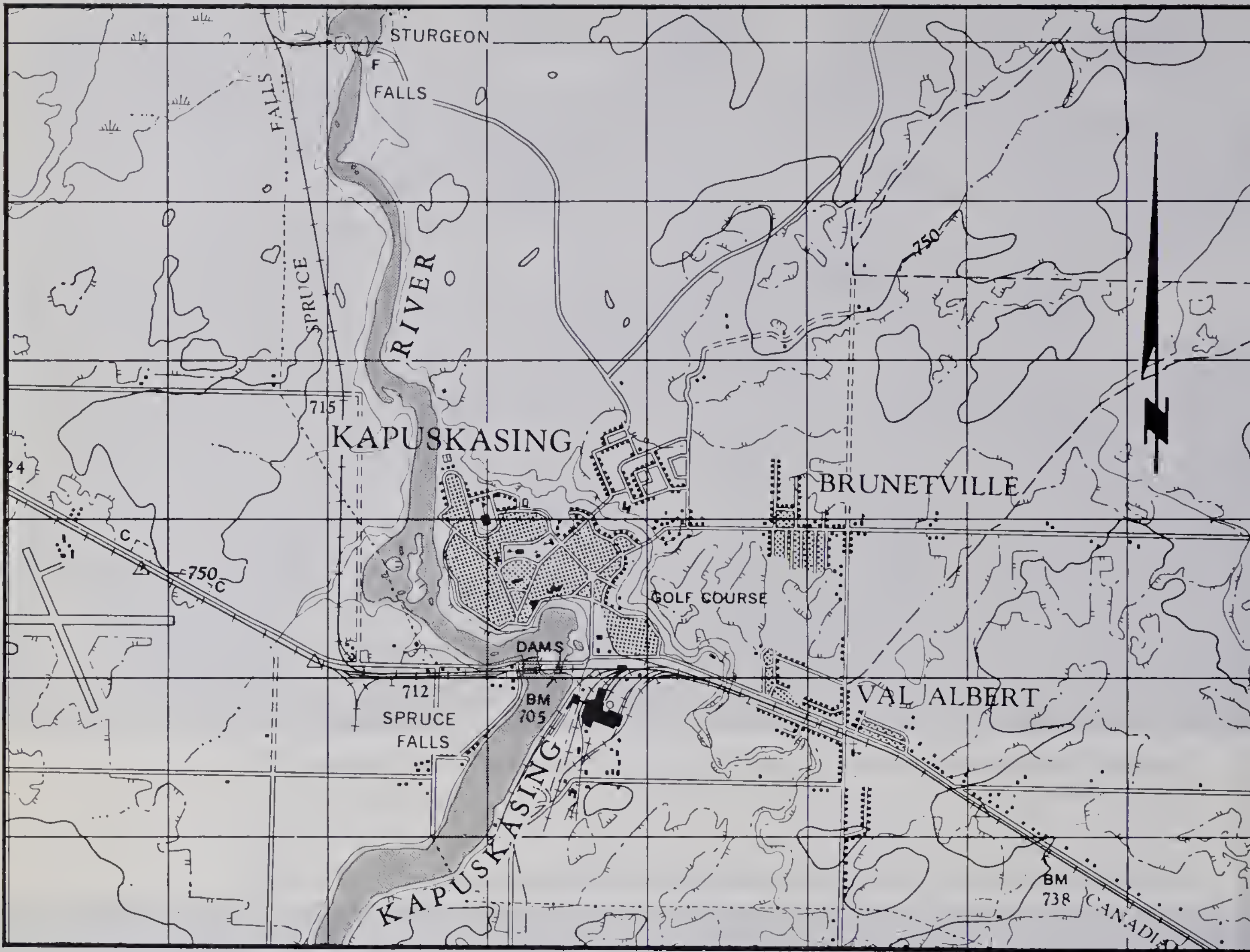
[*] Muskeg is the name given to boggy or swampy areas found throughout much of the Canadian Shield.



3—12 The Spruce Falls Power and Paper Company mill at Kapuskasing (Photographic Survey Corporation)

3—13 An aerial view of Kapuskasing (Photographic Survey Corporation)





3—14 Large-scale map of Kapuskasing on the scale 1:50,000 (Courtesy of Department of Mines and Technical Surveys)

(a) Identify the features already noted in Figure 3—12 that have been indicated by letters in this photograph.

(b) What evidence is there that Kapuskasing is a planned town?

(c) Describe the source of electric power used at Kapuskasing.

(d) Describe the relief of the Clay Belt around Kapuskasing.

(e) State two important uses of the land in the far distance.

(f) Describe some means of transportation available at Kapuskasing.

(g) Make a summary of the several uses of the river to the people of Kapuskasing. In which general direction is the river flowing before it reaches the dam? Refer to Figure 3—14 if necessary in answering this question. Where does the Kapuskasing River have its outlet? Refer to an atlas or wall map for this answer.

3. Figure 3—14 is a large-scale topographic map of Kapuskasing and its hinterland.

(a) Locate the mill and the main part of the town on this map.

(b) Where is Kapuskasing located in relation to the main railway line? Note the course of this line across Northern Ontario, in Figure 3—17. Describe how a freight load of paper from the mill reaches Toronto.

(c) Where is the airport that serves Kapuskasing? Daily flights are scheduled to Toronto from this airport. Refer to Figure 3—17 and calculate the approximate airline distance from Kapuskasing to Toronto.
(d) What is the general elevation of the land around Kapuskasing?
(e) How does the map confirm your answer to question 2(d) above?
(f) In which general direction was the camera pointing when the photograph in Figure 3—13 was taken? Locate on the map the area in the background of the photograph. Describe the location of the buildings. What are these buildings used for?
(g) State four or five factors that explain the importance of Kapuskasing.

A description of the operations of the Spruce Falls Power and Paper Company follows:*

The mill is one of the largest plants of its kind in the world. The paper division can produce 900 tons of newsprint per day. All pulp and paper is shipped by rail and a train load of more than 40 cars leaves Kapuskasing daily for various markets in the United States and Canada.

The biggest problem facing the mill is to ensure a constant supply of wood. More than 400,000 cords are required annually. This is secured from nearly 7000 square miles of crown timber land** leased from the government. Most wood is cut from camps located on this land, but the mill also purchases pulpwood from farmers in the district. New settlers use pulpwood as their cash "crop" and this assists them to establish permanent farms.

The Spruce Falls Power and Paper Company maintains a forest nursery. Each fall, spruce cones are collected from good stands. After the seeds have been extracted from the cones, they are sown in beds. There, the seedlings are tended for two years, as carefully as in any garden. After two years, they are transplanted into rows. Finally, after two more years, they are shipped to the woods for planting in areas that reseed themselves poorly.

In summer, about 1000 men are employed in the woods. In winter, nearly twice that number are employed. Figure 3—15 shows a modern lumberjack felling a tree. At what season was this picture taken? Why are operations more easily carried on at this season than at other times of the year? Comment on the type of forest, the methods of felling and the weather conditions. The men live in modern up-to-date camps where food is plentiful and good. Medical care is supplied by a company doctor who visits the camp at least once a week.

In winter, logs are transported to the mill by truck and rail. Locate the railway line from the north, in Figure 3—14. Wood is moved to this line by truck, having first been cut into four-foot lengths. It is placed on loading platforms beside the track and then loaded on flatcars for delivery to the mill. No wood is moved to the mill by water from the north side of Kapuskasing. Why is this so?

Most wood cut to the south of Kapuskasing is moved to the mill by water. It is hauled during the winter to lakes and streams and piled on the ice in eight- and sixteen-foot lengths. In the spring, the wood moves down the Kapuskasing River until it is stopped by a boom about half a mile upstream from the mill. Here, the logs are raised from the river by means of a jackladder and passed over a platform where circular saws cut them into four-foot

*Information given here and the two photographs used for the preceding questions have been provided through the courtesy of the Spruce Falls Power and Paper Company.
**"Crown Land" refers to any land owned by the provincial or Federal governments—that is, owned by the Crown.

3—15 Wood operations in Northern Ontario (Ontario Department of Lands and Forests photo)

lengths. They are then dropped back into the river where they are kept until required.

Before the wood can be used in the mill, the bark must first be removed. For this purpose, the logs are placed in revolving drums and sprayed with water under enormous pressure. This removes the bark and is one of several uses made of water in pulp and paper mills. Large quantities of steam are used to "cook" the pulpwood, to dry the pulp, to heat the mill, and to generate electricity when insufficient hydro-electric power is available. A great deal of water is used, first to dilute the pulp and then to clean it before the paper-making stage. For all these reasons, a waterside location is almost essential to any pulp and paper mill. It has been estimated that 250 tons of water are used in the manufacture of one ton of pulp.

3—16 Smoky Falls is the chief source of electricity for the Kapuskasing mill. (Ontario Department of Travel and Publicity photo)

Every mill requires large quantities of cheap hydro-electricity. In the Kapuskasing mill, 24 huge stone grinders crush and grind the logs into pulp. **One** of these grinders uses five times as much electric power as is needed by the 8000 people of Kapuskasing. The power plant in Figure 3—13 produces only a fraction of the electricity required by the mill. The main supply comes from Smoky Falls, about 50 miles north of Kapuskasing. This development is shown in Figure 3—16. Here, the Kapuskasing River has been dammed as shown at the left of the photograph. In this region, the waters of the Canadian Shield are flowing swiftly downward towards Hudson Bay. By damming the river, full advantage can be taken of this drop. At the same time, by raising the level of the lakes and streams behind the dam, the transportation of logs is made easier. When logs have to be floated past a dam or powerhouse, a system of booms and flumes is used. These are shown in Figure 4—29, on page 166. In this photograph, the boom prevents the logs from interfering with the power plant. A **flume,** or chute, as shown in this photograph, carries the logs below the dam.

As the water pours down through the powerhouse at the right in Figure 3—16, it turns the blades of giant machines called **turbines.** These turn generators which produce electricity. This electric power is transmitted to the Kapuskasing mill.

As indicated by Figure 3-4, the Canadian Shield has innumerable lakes. In one area of Northern Ontario, extending over 1000 square miles, no less than 7500 lakes have been counted. Many were formed as a result of the damming of streams and rivers by material deposited by glaciers during the Ice Age. The ice also scooped out hollows which later filled with water. The underlying hard Shield rocks have prevented the water from draining or seeping away. All these lakes serve as natural storage basins, supplying water to such rivers as the Kapuskasing. Annual precipitation at Kapuskasing averages about 27 inches. This is sufficient to supply the lakes and streams of the area. Snowfall averages 100 inches per year and the spring run-off from this amount when it melts provides a supply of water sufficient to keep hydro-electric plants operating even throughout a dry summer. Snow thus also stores water and the cold winters of the Canadian Shield are an asset in the production of hydro-electricity. Even so, water levels often fall so low during the late summer and early autumn that the output of hydro-electricity is reduced.

An extensive softwood forest, mainly of spruce, balsam fir, and jackpine,* and abundant supplies of hydro-electricity are the factors that have made Northern Ontario one of the world's great producers of pulp and paper, exceeded in Canada only by Quebec. Mills producing pulp and paper under conditions similar to those described at Kapuskasing, are located at many centres throughout Northern

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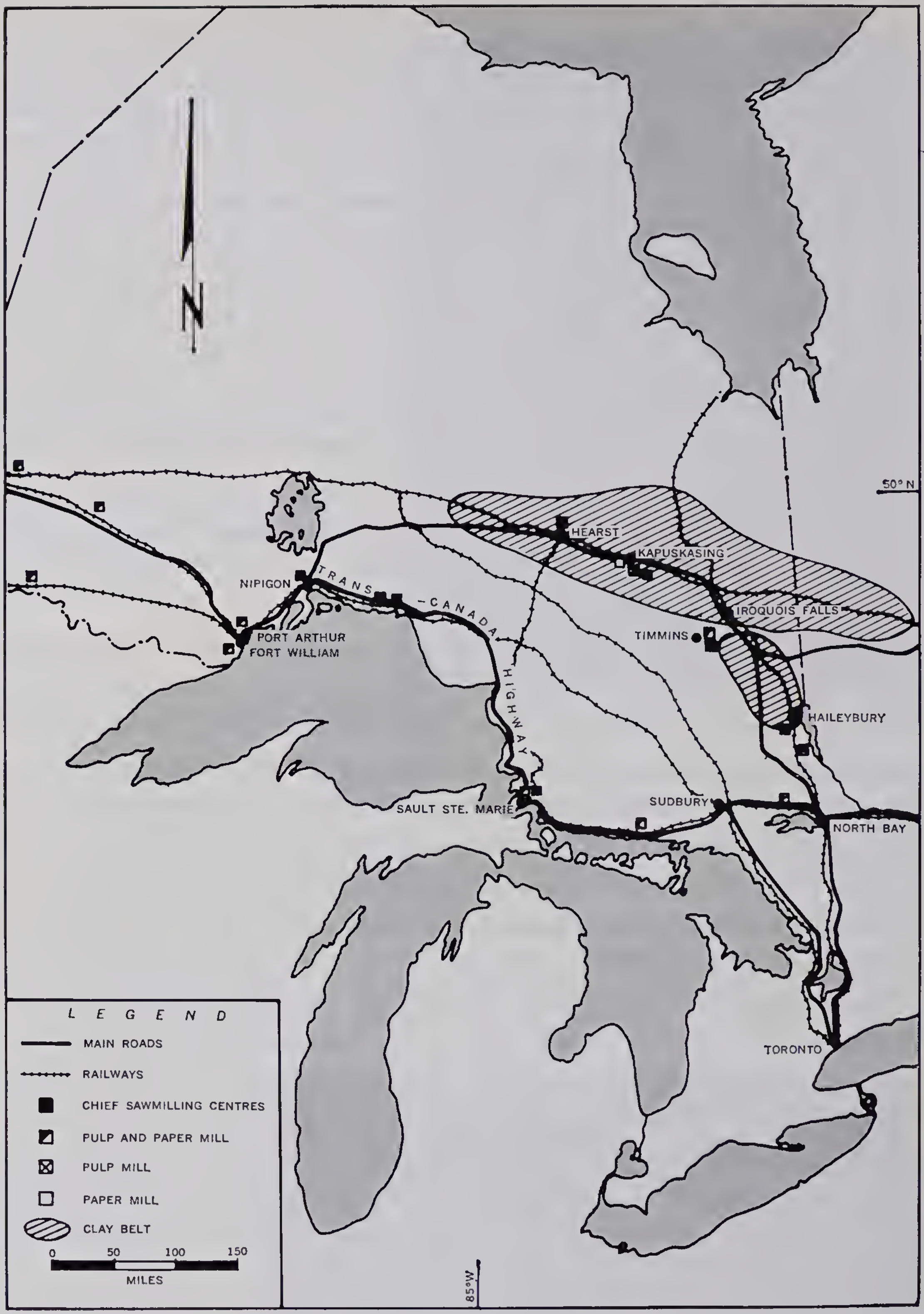
*Recent experiments have made it possible to use hardwoods, such as poplar and birch in the making of pulp. Fuller use of the Shield forests has thus been made a reality.



3—17 Forest industries, main road and railway routes of Northern Ontario

Ontario. Note the distribution of mills as shown in Figure 3-17.

In most years, newsprint is Canada's largest export. Most of the output goes to the United States. In addition to those employed directly in the woods and mills, the pulp and paper industry gives employment to many thousands of other people, such as railway workers who transport newsprint to markets. Think of some other jobs created indirectly by the pulp and paper industry.

The output of sawn lumber is less important than that of pulp and paper. Nevertheless, in a town such as Kapuskasing, much lumber used in local construction is cut in the area. Considerable quantities are sold in Southern Ontario and sawmill products are exported to the United States and overseas.

Conservation of the forests is of great importance to the people of Ontario. Modern conservation is based on two ideas: more lumber should be grown than is cut; and the forest should be permitted to renew itself by natural re-seeding. An area that has been cut over may take as much as 80 years to re-seed itself. Where this does not take place, trees are planted, as already described at Kapuskasing. *Controlled cutting* means that only those trees of the proper age, size, and quality should be cut. In this way a farm woodlot can produce a timber crop every year.

Crown lands in Ontario have been divided into forest tracts which companies are licensed to cut. These licences ensure that wise forest practices will be followed. In deciding how much wood can be cut each year, allowance must be made for losses resulting from fire, insects, and diseases – the three great enemies of the forest. Of these, fire is the worst, and the Ontario Department of Lands and Forests is very well equipped to fight forest blazes.

Human beings are the chief cause of the 1400 forest fires that occur in Ontario every year. Carelessness is the main problem. Of all the fires caused by human beings, 54 percent are started by campers and smokers. During the past 50 years, it has been estimated that loss of forestland has averaged 1760 acres (nearly three square miles) *every day.* To combat fire, the Ontario government maintains 300 lookout towers and 27 air bases. Two thousand men are employed as fire fighters during the summer season. Figure 3-18 is a photograph of a huge forest fire raging almost out of control near Kapuskasing on June 18, 1955. It will be many years before plants and trees can grow there again. Large numbers of animals are destroyed in such fires every year.

Of insects, the greatest menace is the spruce budworm which has destroyed thousands of square miles of valuable timberland already. This is the larva of a moth that lays its eggs on the buds of various trees, especially balsam and spruce. The eggs hatch caterpillars (larvae) that feed on the tender new buds of the trees.

Research is being carried on to improve the quality of trees and to

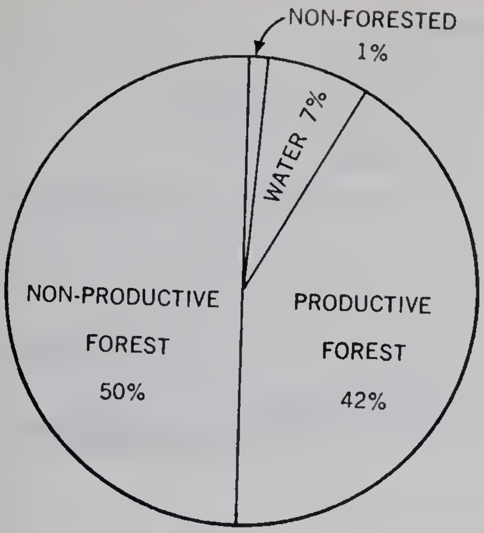
3—18 A great forest fire raged near Kapuskasing in 1955. (Ontario Department of Lands and Forests photo)

make them more resistant to insects and diseases. Attention is being given to methods of making trees grow faster. Some progress has been made and it is hoped that, soon, certain types of trees that now take 40 years to grow may reach maturity in 20 years.

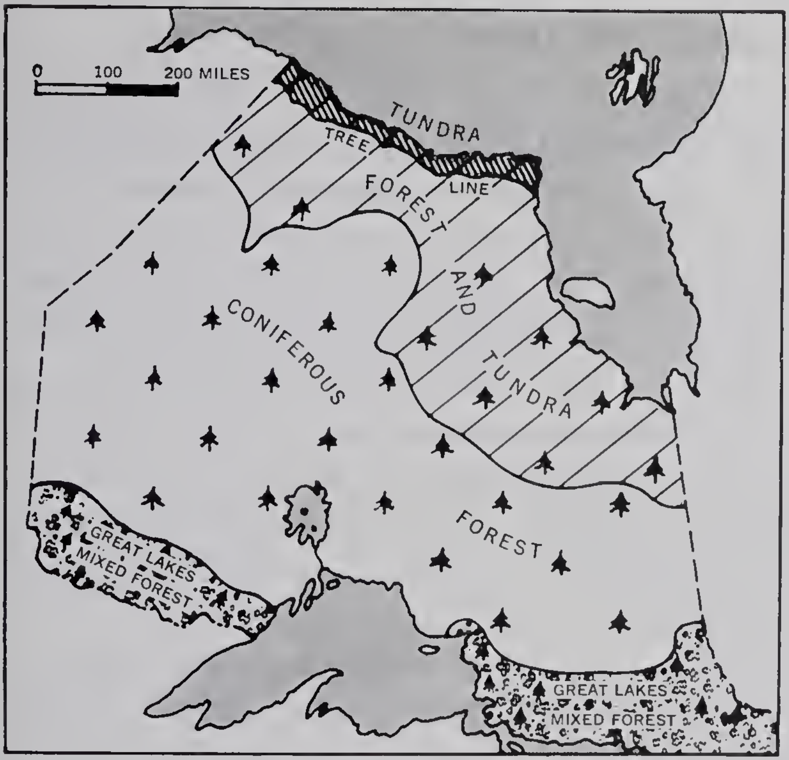
Another conservation problem closely related to the forest industries is that caused by stream pollution. Pulp and paper mills, by discharging their waste chemicals into rivers and lakes, have polluted the water supply of towns and villages and have killed millions of fish or prevented them from breeding. Methods of recovering these wastes and of using them again have recently been discovered.

Vast though the forests of Northern Ontario are, considerably less than half the region consists of usable forest. In one study of an area covering 64,000 square miles, the surface cover was found to be divided up as shown in Figure 3-19. Non-productive forestland included rock, flooded land containing brush and alder, open muskeg, treed muskeg, and bogs. Figure 3-20 shows the vegetation belts of Northern Ontario. The region just described extends across the area labelled "Coniferous Forest." In spite of this label, half the area is non-productive forest. To the north of this belt lie forest and *tundra,*[*] where very little wooded land is of any value. Describe the location of the *tree-line* in Northern Ontario. North of this line, the complete lack of trees reminds us that the Arctic region penetrates into the province. This area is part of the low-lying region called the Hudson Bay Lowland. Thousands of square miles of this lake-dotted land lie near sea level, stretching endlessly to the horizon as an almost perfectly level, uninhabited plain. The Hudson Bay Lowland extends

[*] Tundra is defined and discussed on page 444, Chapter 10.



3—19 The surface cover of a large area of Northern Ontario



3—20 Vegetation regions of Northern Ontario

westward into Manitoba. Figure 6-35 and 6-36 in Chapter 6 are a map and photograph of part of the lowland near Churchill, Manitoba. What characteristics of the Hudson Bay Lowland, already described in Northern Ontario, are evident in the map and photograph? In the Ontario section of the lowland, Moose Factory and Moosonee are the only centres of importance. Moosonee is the northern terminus of the Ontario Northland Railway and is a port of some significance. Many Indians live in this area and fur trapping is the main occupation.

Locate the hydro-electric projects at Abitibi Canyon, Otter Rapids, and Pine Portage, in Figure 2-40. These, along with several large projects shown on the Ottawa River, are the major sources of power for the smelters, the pulp and paper mills, and the sawmills, as well as for the towns of Northern Ontario.

Northern Ontario's forest industries — a summary

1. State the advantages of a waterside location for pulp and paper mills.
2. What purposes are served by damming rivers in Northern Ontario?
3. How were the innumerable lakes of the region formed?
4. State the reasons why it is possible to produce such vast amounts of cheap hydro-electricity in Northern Ontario.
5. Discuss the importance of the pulp and paper industry to Canada.
6. (a) What is meant by "controlled cutting"?
   (b) List the main conservation problems associated with the forests of Northern Ontario.
   (c) What government measures are attempting to conserve the forests of the region?
7. Why is the Hudson Bay Lowland so thinly populated?

FARMING IN NORTHERN ONTARIO

The "Little Clay Belt," shown in Figure 3-9, was the first region north of North Bay to be farmed. Colonization roads and railways were extended into the region mainly to promote farming. New Liskeard and Haileybury were opened to settlement during the period 1900 to 1910. Later, farming spread into the main Clay Belt. Kapuskasing will illustrate the climatic, soil, and other conditions that prevail in this region. There are 500 farms within a 50-mile radius of the town. They include 60,000 acres, about one third of which is *improved land.** Hay and oats are the chief crops. Some potatoes are grown. Beef cattle are an important source of income, and dairy produce, for local sale, provides cash to most farmers. Many also sell pulpwood from their woodlots.

Heavily forested land and large areas of poorly-drained soil, including much muskeg and bog, make most of the Clay Belt unproductive. It has been estimated that less than ten percent of the region can be successfully farmed. Much of the soil is acidic, a condition often found where coniferous trees thrive. The decay of such vegetation forms an acid soil. Apart from poor drainage caused by the underlying hard rock, the presence of patches of *permafrost*** causes some areas to be unproductive.

With the use of fertilizers, many soils of the Clay Belt yield good crops. This is especially true around Kapuskasing. There, as elsewhere in the region, climate is the critical factor.

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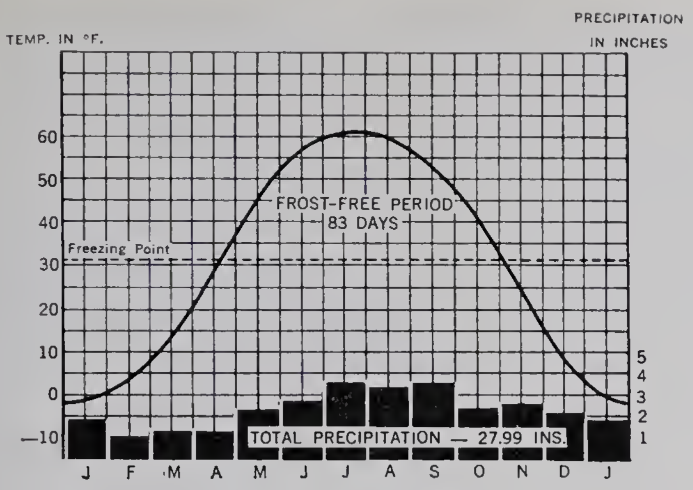
*This term is used to describe land that has been fenced, ploughed, cultivated, or improved over its natural state in some way. Unimproved land includes woodlots, rough pasture, and waste.

**Permafrost is permanently frozen ground. For a fuller explanation of it, see page 446.



3—21 Climatic graph of Kapuskasing

The Climate of Kapuskasing (Figure 3-21)

1. (a) What is the January average temperature at Kapuskasing? Compare this with Windsor, in Figure 2—51.
(b) How many months have average temperatures below freezing at Kapuskasing? Again, compare this with Windsor. The lowest temperature ever recorded at Kapuskasing was —53°F.

2. What is the July average temperature at Kapuskasing? Days in this month are often extremely warm. The highest temperature ever recorded there was 101°F. This is warmer than the highest temperature (98°F.) ever recorded at Montreal. How does Kapuskasing's record high temperature compare with that in your neighborhood?

3. The frost-free season at Kapuskasing averages 83 days. Again, compare this with Windsor and with your neighborhood.

4. (a) What is the total annual precipitation at Kapuskasing?
(b) Comment on the amount of precipitation available during the growing months (June, July, and August). Is this favorable for agriculture? Compare this data with similar data for Windsor and St. Catharines (Figure 2—16).
(c) Of Kapuskasing's total precipitation, about 100 inches occurs as snow. How does this compare with Windsor? With your neighborhood?

5. From this study, state the main features of the climate of Kapuskasing.

Moderate summer temperatures, including cool evening conditions, result in a fairly low rate of evaporation during the growing season at Kapuskasing. Why do lower temperatures result in a lower rate of evaporation? As a result, rainfall is more effective here than in Southern Ontario, where summer temperatures are higher. This is especially helpful during unusually dry periods. However, lower temperatures also mean that marshy, low-lying areas retain their water content and are useless for farming.

Kapuskasing is located 7 degrees (about 500 miles) north of Windsor. It thus has a considerably longer summer day than any part of Southern Ontario. With three or four more hours of daylight available each day, hay and grains grow faster and mature more quickly.

This helps to compensate for the short growing season. Although beef cattle at Kapuskasing had an outdoor grazing period of only 112 days in 1958, the long days enabled them to add as much weight as they would have during a normal season in Southern Ontario.

A major problem of the growing season is its variability from year to year. Thus, in 1947 it was impossible to sow crops at Kapuskasing until June 16th. In 1955, seeding began on April 24th. On June 8, 1944, after seeding had taken place, a low night temperature of only 26°F. caused severe damage to many crops, especially vegetables.

Marked variations occur in climate not only from year to year but also from place to place within any given year. This is indicated by the following data on the frost-free season at various places:

Haileybury	123 days
Kapuskasing	85 days
Hornepayne (130 miles west of Kapuskasing)	34 days
Sioux Lookout	106 days
Port Arthur	117 days
Savanne (75 miles northwest of Port Arthur)	32 days

These great variations occur as a result of a place's location with respect to water, lowland, highland, or other factors. For example, Haileybury is located near the shores of Lake Temiskaming. Cooler air drains downward towards the lake and this retards frost in the neighborhood of the town. Other places, in the same area, located in shallow depressions, have much shorter growing seasons. Hornepayne is surrounded by low, rocky hills and faces a constant threat of frost, even in July. This is because daytime heat radiates from the rocky surfaces to clear skies at night.[*] At the same time, chilled air drains to the lower levels around the town. Port Arthur benefits from its location on Lake Superior where cool air drains onto the surface of the lake.

As a result of the variations noted, farming is not always possible on the best soils, which may occur where the threat of frost is greatest.

In spite of variations, *isopleth maps*[**] show certain regular features extending from south to north throughout Northern Ontario.

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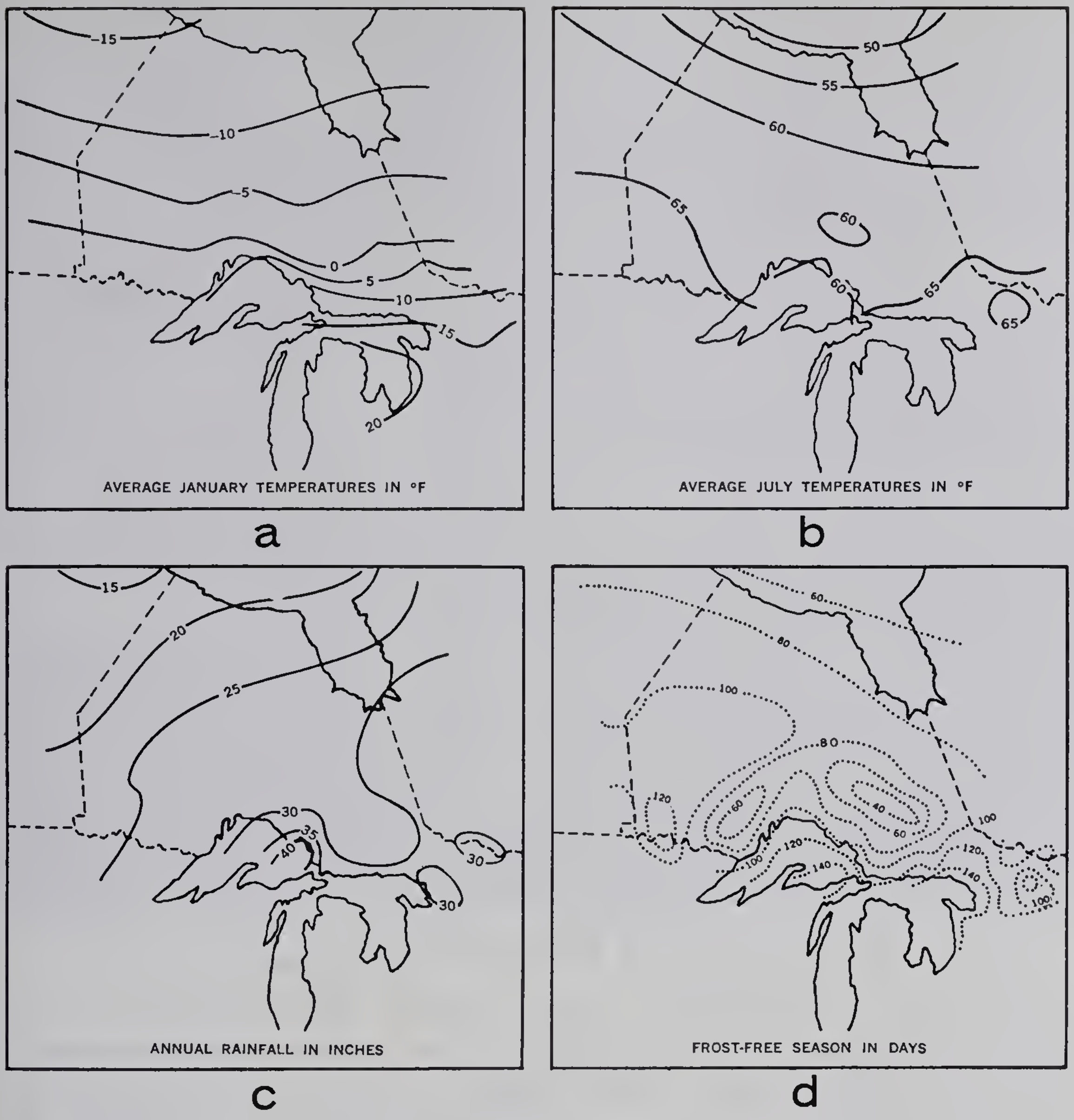
[*] Temperatures are usually lower on clear nights than on cloudy nights. Clouds prevent the heat, absorbed by the earth during the day, from radiating back quickly into the atmosphere.

[**] An isopleth is any line on a map connecting similar elevations, or temperatures, or rainfall, etc. A contour line is an isopleth. An isotherm is a particular kind of isopleth and connects places having approximately the same temperatures.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FROST-FREE SEASON IN DAYS
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3—22 Four important climatic maps of Northern Ontario

What are the general features of the climate of Northern Ontario?

1. Figure 3—22a shows January isotherms throughout Northern Ontario. Describe temperature conditions during January, noting especially the variations from south to north. How much of Northern Ontario has January averages below zero?
2. Describe temperature conditions during July, noting again the variation from south to north.
3. Describe the variations in rainfall from south to north.
4. (a) Where is the area of shortest frost-free season in Figure 3—22d? Refer to a relief map and state why frost-free seasons are shorter there than much farther north around Hudson Bay.
(b) Where are the longest frost-free seasons in Northern Ontario found?

The farming areas of the Clay Belt are often referred to as the "pioneer fringe." These are areas where modern pioneers are still settling new lands. Farmland occurs in scattered pockets or patches (of which the Kapuskasing area is one), separated by large areas of rough country. Less than 3000 farms exist in the Clay Belt. These represent only a tiny fraction of Ontario's total farm acreage. However, many farmers make a good living selling their produce to the mill and mining towns. Elsewhere in Northern Ontario, in the Nipissing Lowland around North Bay, in the Sudbury Basin, and in the hinterlands of Sault Ste. Marie and the Lakehead cities, small farming districts have developed. These are similar to the Clay Belt and represent important sources of food to the surrounding communities.

THREE URBAN CENTRES: NORTH BAY, "THE SOO," AND THE LAKEHEAD

Unlike Sudbury, which remains basically a "one industry" town, the three other large centres of population have several functions that remind the visitor of the cities of Southern Ontario.

Settlement at North Bay began with the arrival of the Canadian Pacific Railway in 1882. By 1900, North Bay was an important lumbering centre. Although many of the original pine forests have long since been removed, some of the largest sawmills of the Nipissing District are still found near the city. When the Canadian National Railway linked North Bay with Toronto, and when, in 1903, the city became the southern terminus of the Ontario Northland Railway, its future as a gateway centre was assured. Today it is also a junction of Highways 11, 17 (The Trans-Canada), and 63. Locate all rail and road routes named, in Figure 3-17. North Bay is the major focus of routes in Northern Ontario and is a main distributing centre of the region.

The city is located in an agricultural district that includes 2350 farms. As the "capital" of the District of Nipissing (which contains 70,000 people), it is a regional centre of importance. Within the city, the three railway lines employ 2300 workers. An air force base, an explosives plant, a factory making insulating material, and several sawmills employ the bulk of the remaining working population. Nearby Sturgeon Falls is one of several sources of hydro-electricity available to North Bay. This city is on the Trans-Canada Gas Pipeline.

Sault Ste. Marie is the western end of a zone of lowland that stretches from the Ottawa Valley through the Nipissing Lowland and the Sudbury Basin to Lake Huron. This strip of lowland contains more than one third of the population of Northern Ontario. Its stretches of fairly fertile soils, milder climate, *mixed forest,** and fairly

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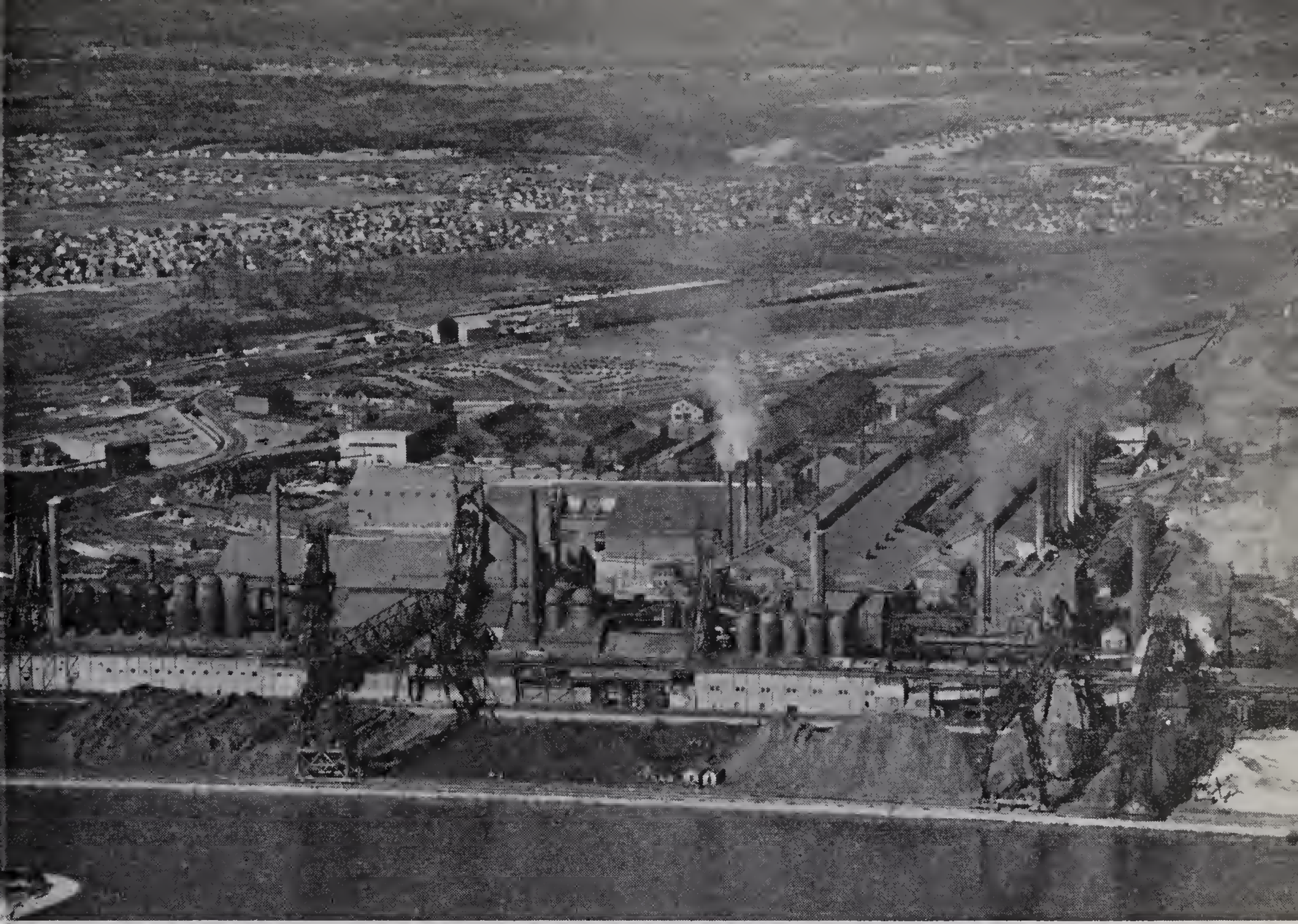
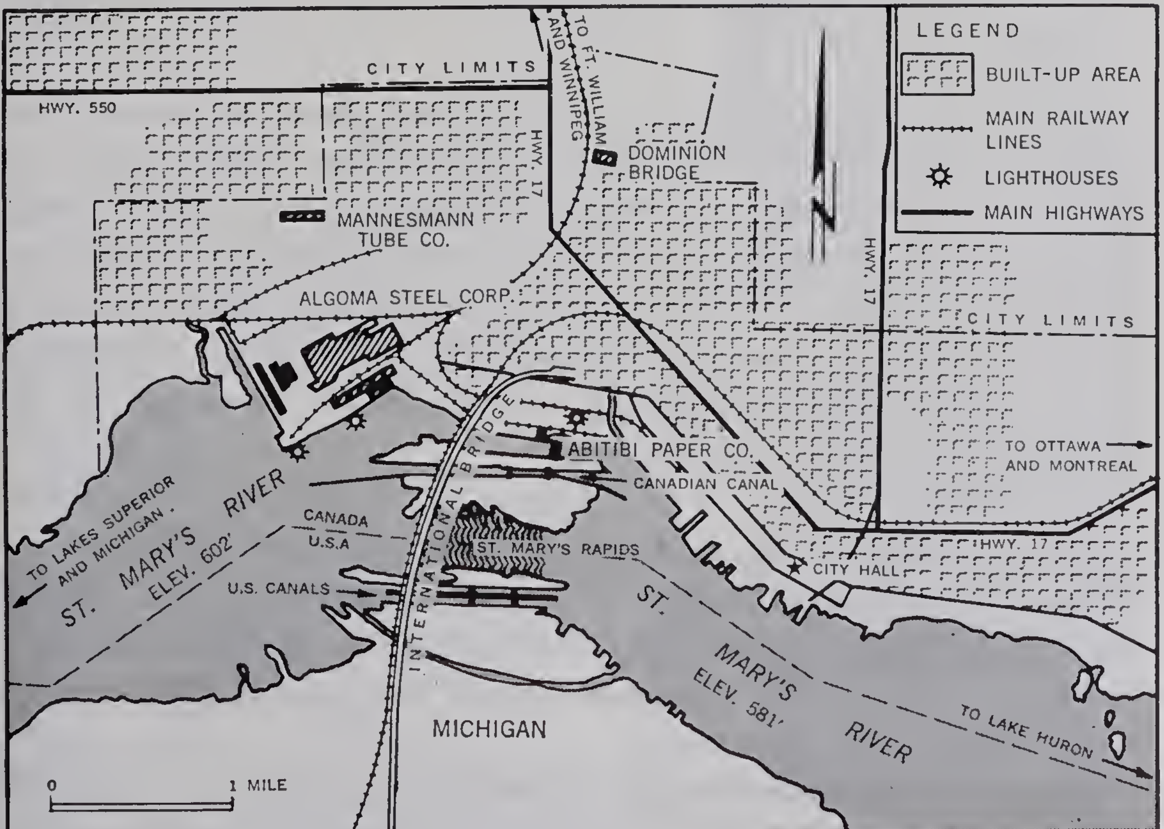
*This is also known as the Great Lakes Forest. Bordering the Great Lakes, it includes both coniferous (evergreen softwood) and deciduous (hardwood) trees. This is unlike the rest of Northern Ontario which consists mainly (although not entirely) of softwood trees, and Southern Ontario which consists mainly of hardwoods.



3—23 An aerial view of part of Sault Ste. Marie (George Hunter photo)



3—24 A large-scale map of Sault Ste. Marie dense settlement make it different from the rest of Northern Ontario. It is the *transitional zone,* referred to on page 102.

Sault Ste. Marie ("The Soo") has, in its long history, been an Indian village, a fur trading post, a mission, a lumbering centre, a supply depot for prospectors, and today is one of the three great iron and steel manufacturing centres in Canada. It is also one of the chief ports on the Great Lakes.

Why is Sault Ste. Marie a major centre of Northern Ontario?
(Figures 3-23 and 3-24)

1. Note the great iron and steel mill in the photograph.
(a) Where does the iron ore come from? How is it transported to "The Soo"? The coal required in smelting is imported from the United States by "laker."
(b) What other means of transportation are available at "The Soo"?
(c) According to the map, on which side of the city is the iron and steel plant located?
(d) Compare this iron and steel development in size with that at Hamilton, studied in Figure 2—25.
2. What other important industry is indicated on the map?
3. (a) Why are canals necessary at Sault Ste. Marie? How many are located here?
(b) Where is the harbor area located in relation to the city?
(c) What is the difference in elevation between Lake Superior and Lake Huron?
4. Sault Ste. Marie is an international border crossing point.
(a) Which American state is located to the south?
(b) How do automobiles reach the United States side?
(c) Is this as busy a border crossing point as Sarnia or Windsor? Give reasons for your answer.

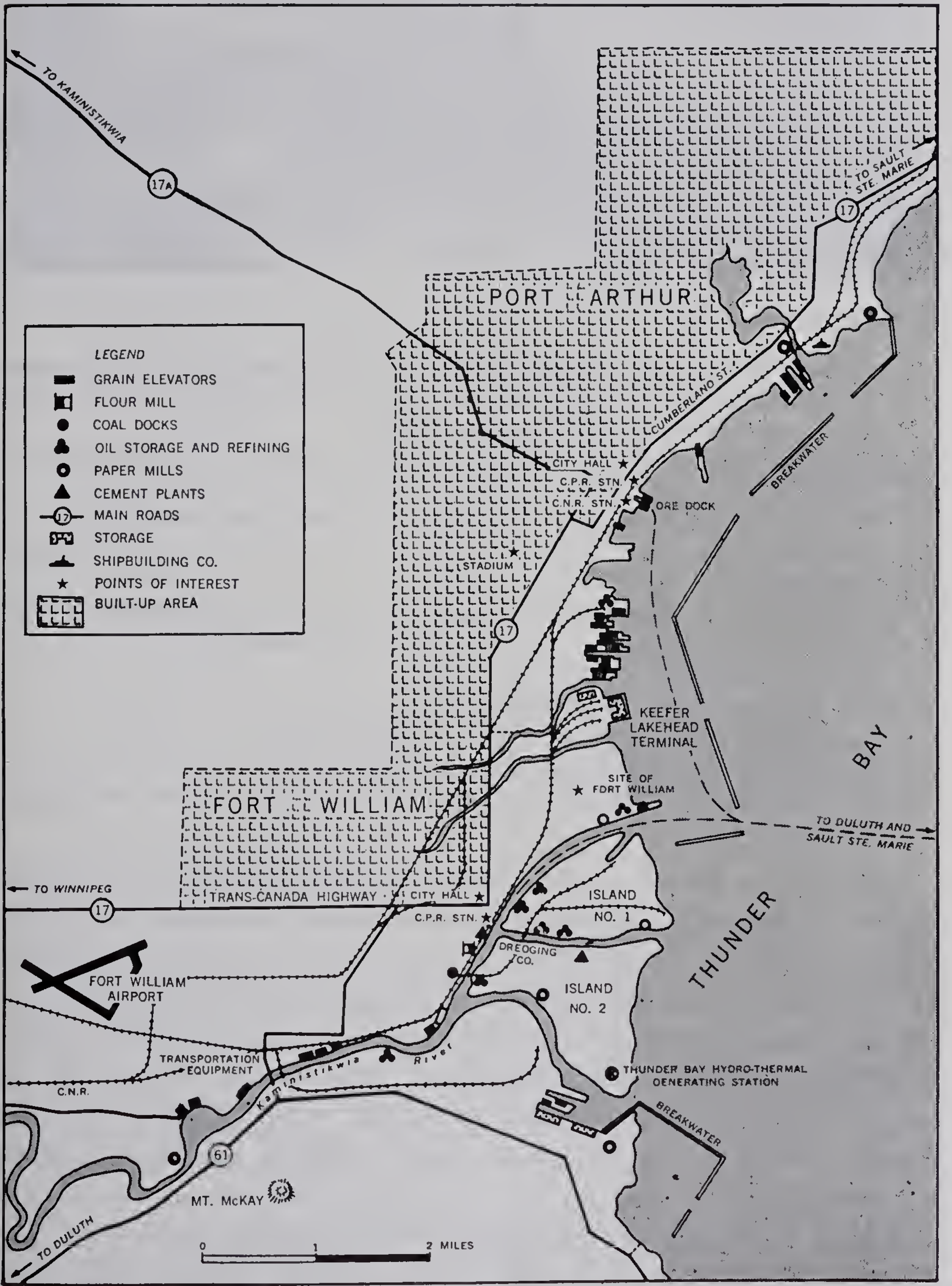
As well as its iron and steel and pulp and paper industries, "The Soo" has sawmills, chemical plants, and railway repair shops. Its canals, on both sides of the international boundary, make the St. Mary's River one of the busiest channels in the world. In a typical year, these canals handle more traffic than those at Suez and Panama combined. Sault Ste. Marie is a gateway city for traffic moving in both directions on the Great Lakes. Its twin city, on the United States side of the boundary, is somewhat smaller.

The Lakehead is made up of the twin Canadian cities of Port Arthur and Fort William. Including other settlements in the Thunder Bay District, these cities and their hinterland contain more than 135,000 people. The Lakehead thus ranks with Sudbury as a major urban centre of Northern Ontario, and compares in size with such southern centres as the Kitchener-Waterloo area.

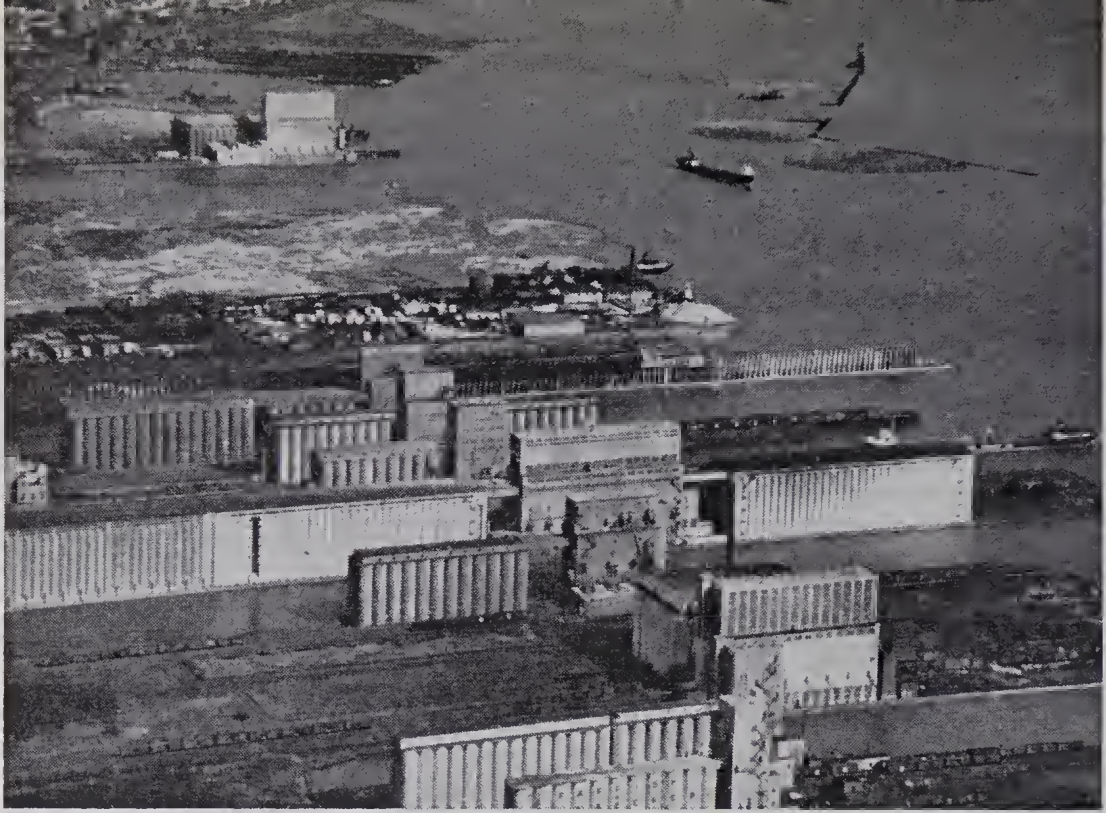
The Lakehead Harbor handles 12,000,000 tons of grain in an average year. Twenty-six grain elevators include the Saskatchewan Wheat Pool Elevator No. 7, with a capacity of 9,000,000 bushels. This is the largest grain elevator in the world and holds enough wheat to make 20 loaves of bread for every inhabitant of Canada. Nearly 3000 vessels call at the Lakehead each year.

Using a photograph and a map to explain the importance of the Lakehead

1. Describe the location of Port Arthur in relation to Fort William, in Figure 3—25.
2. Make a list of the major cargoes handled by both ports.



3—25 A large-scale map of the Lakehead port



3—26 Aerial view of part of the Lakehead harbor (National Film Board photo)

3. Make a list of the industries carried on at the Lakehead. Where possible, indicate the sources of the raw materials used in these industries.
4. There are 350 miles of railways in these ports.
(a) What evidence does the map give of the importance of railways at the Lakehead?
(b) List some goods brought by rail. Where do these goods come from?
5. (a) What evidence is there that severe storms sometimes occur on Lake Superior?
(b) Although the Lakehead is a good natural harbor, what evidence is there that it must on occasion be deepened and kept free of silt?
6. In the photograph in Figure 3—26 find:
(a) two forms of transportation noted on the map.
(b) evidence of the main cargo handled by the Lakehead.
(c) evidence of other important activities here.
7. In which general direction was the camera pointing when the photograph was taken?

The iron ore docks of the Lakehead ship 3,000,000 tons of ore per year. Where does this ore come from? How does it reach the Lakehead? In addition to having excellent rail and water facilities, the Lakehead is on the Trans-Canada Highway and is a hub of other roads leading to various mining and lumbering centres in northwestern Ontario. The hinterland supplies abundant hydro-electric power. Natural gas is received here from Alberta and, as already noted, plentiful coal and oil are brought to the port. The various industries have inexhaustible supplies of fresh water.

East of the Lakehead, the Nipigon area is part of the Thunder Bay District. Which river drains the waters of Lake Nipigon into Lake Superior? One of Northern Ontario's notable hydro-electric power installations is located on this river. What industry is carried on in the Nipigon Valley and along the shore of Lake Superior to the east? Refer to Figure 3-17.

Far to the west of the Lakehead in the Lake of the Woods area are the settlements of Fort Frances and Kenora. Activities in these centres are based on the familiar Shield resources of forests and water power. Like much of northwestern Ontario, these towns, totalling 20,000 people, look to Winnipeg, rather than to Toronto as their large city. Refer to Figure 3-17 and estimate the length of an automobile or railway journey to Toronto from Kenora. How far is it to Winnipeg?

Summarizing Northern Ontario

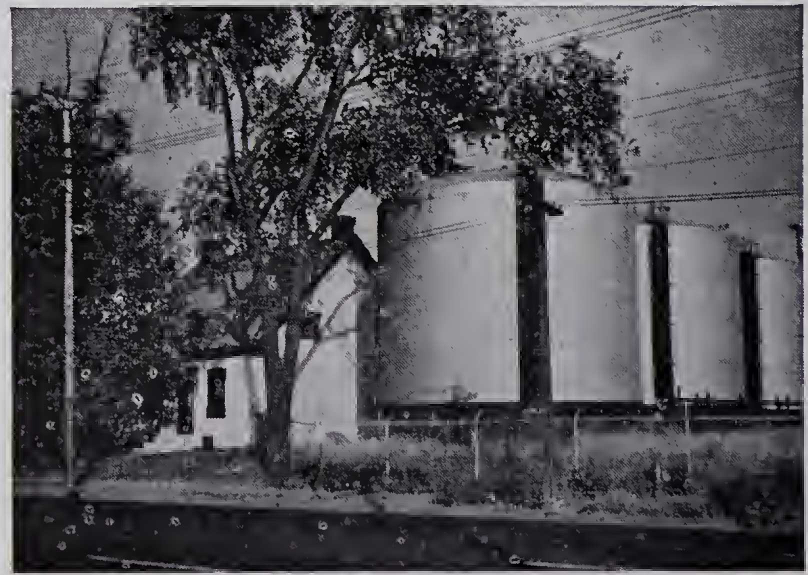
1. Tourism is a great and growing industry in many parts of Northern Ontario. The area illustrated in Figure 3—4 attracts many visitors.
(a) Why would it be wise to hire a guide if you visited this area on a fishing trip?
(b) Would the fishing be good in an area like this? Why?
(c) Describe the best method of travelling short distances in this type of country. What would be the best method of travelling long distances?
(d) What activities besides fishing would be of interest to visitors in this part of Northern Ontario?
(e) Notice the distribution of provincial parks on a road map of Ontario. In which region, Northern or Southern, are parks larger and more numerous? Why?
2. Northern and Southern Ontario are the two great regions of this important province.
(a) Make a list of the main differences between these two regions. In your list, consider such items as size, population, climate, vegetation, resources, kinds of occupations, etc.
(b) Think of some important ways in which the **appearance** of the landscape is different in each region. List some things that you would expect to see in one region and not in the other if you took a train trip across each.
(c) What are the chief explanations for the differences between these regions?
3. The average population density throughout Northern Ontario as a whole is only about two persons to the square mile. How does this compare with the population density of Southern Ontario? Why is Northern Ontario always likely to remain sparsely populated?
4. (a) Chapter 1 describes several problems faced by the Canadian people. Which of these problems are most evident in Northern Ontario?
(b) How does Northern Ontario make a major contribution to the great wealth of natural resources possessed by the Canadian people?
(c) Natural resources are often classified as **renewable** (if those used can be replaced or renewed again in the future) or **non-renewable** (if, once used, they cannot be replaced). Name the greatest renewable resource of Northern Ontario. What steps must be taken to be certain that this resource can be renewed? Name some important non-renewable resources. How can we best preserve these for future generations?
(d) The bulk of many products of Northern Ontario are exported and form some of the major items in Canada's foreign trade. List some of these products and state to which countries they are exported in greatest quantities. A recent **Canada Year Book** may assist in answering this question.

CHAPTER 4

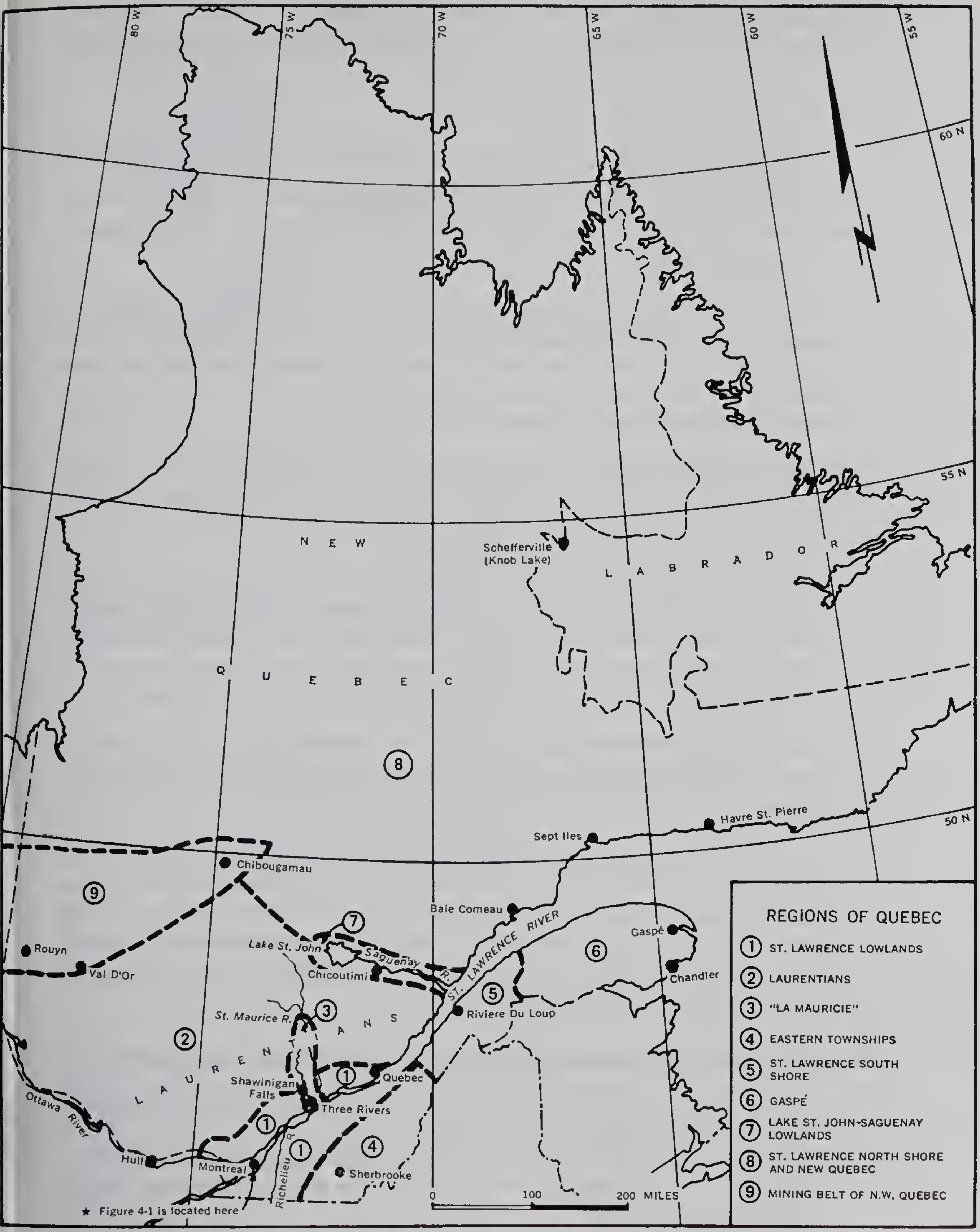
The Province of Quebec: A Blend of Old and New

The picture in Figure 4-1 was taken near the St. Lawrence River, in the east end of Montreal. The house is one of the oldest in Canada, for it was there in 1776, when the American Revolution broke out. It is a stone house of a type often seen among old French-Canadian homes. Describe some features of the architecture. There are many old houses of this type in and around Montreal, although most people live in modern bungalows and cottages, or in great apartment buildings and blocks of flats. What is the function of the tanks that are visible in the picture? Of what important industry in Montreal, one in which this city leads all Canada, do they give evidence? There are many hundreds of these tanks located on level land near or beside the St. Lawrence River in Montreal. Suggest reasons why they are probably located near the river.

The scene in Figure 4-1 is in the St. Lawrence Lowlands, one of the most important Canadian regions, extending partly across Southern Quebec and westward into Ontario. Figure 4-2 is a map of the province of Quebec and the location of Figure 4-1 is given on it. Notice the names given to the regions of the province. The St. Lawrence Lowlands has had a long history, yet is one of the fastest growing and



4—1 Old French-Canadian home and oil storage tanks in Eastern Montreal (R. L. Day photo)



4—2 The regions of Quebec. The location of Figure 4—1 is indicated by an arrow near Montreal's harbor.

most modern parts of Canada. How are both these features — a long history and modern development — illustrated in Figure 4-1? The main purpose of this chapter is to explain why the St. Lawrence

Lowlands, one of the smallest regions in Canada, is nevertheless one of the wealthiest, containing about one sixth of the Canadian people.

THE ST. LAWRENCE LOWLANDS

The first white man to visit this part of Canada was Jacques Cartier who arrived in 1535. Here is part of his description of the St. Lawrence River and the North Shore below Quebec City, as it appeared on his voyage in 1534.*

> "If the soil were as good as the harbors, it would be a blessing; but the land should not be called the New Land, being composed of stones and horrible rugged rocks; for along the whole of the north shore, I did not see one cart-load of earth and yet I landed in many places. Except at Blanc Sablon there is nothing but moss and short stunted shrub."

On his second voyage, a year later, he reached the much more pleasant country of the Lowlands at and above the present site of Quebec City. This is how he described it:

> "This region is as fine land as it is possible to see, being very fertile and covered with magnificent trees of the same varieties as in France, such as oaks, elms, ash, walnut, plum-trees, yew-trees, cedars, vines, hawthorns, bearing a fruit as large as a damson, and other varieties of trees. Beneath these grows as good hemp as that of France, which comes without sowing or tilling it. . . ."

Cartier next visited the Indian village of Hochelaga, where Montreal now stands. This is his description of the site of what is now Canada's largest city:

> ". . . we went along and about half a league farther on began to come upon ploughed fields, and fair large meadows full of their manner of corn . . . as large as a pea or larger, whereon they live as we do on wheat. And amid these fields is situated and placed the . . . town of Hochelaga, stretching up to a mountain which lies beside it, which is well cultivated and most fertile, and from whose top one can see to a great distance."

What impression did Canada make on the first French explorer?

1. Which region of Canada is shown by Cartier's first description? What reason can you suggest for the lack of soil that he noted?
2. Why did Cartier consider the Lowlands soil near Quebec to be fertile?
3. What was "their manner of corn" which Cartier says was the main food of the Indians at Hochelaga?

When Cartier visited Hochelaga, he was forced to leave his vessels some miles downstream, as the St. Lawrence was too shallow in many

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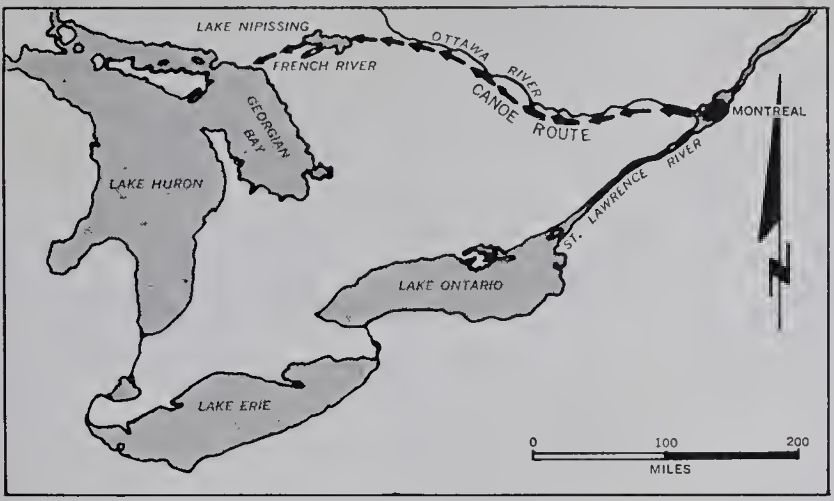
*Extracts quoted from Cartier's journals which were edited by H. P. Biggar for the Public Archives of Canada. They are reproduced here from Reid, McNaught, and Crowe, *A Source-Book of Canadian History*, and are quoted by kind permission of the publisher, Longmans, Green and Company, Toronto.



4—3 The Ottawa River-Lake Nipissing canoe route

places for boats. He also saw the famous Lachine Rapids on the south side of Montreal Island. These rapids prevented him from going farther by water. Yet today, ocean vessels can sail right to Montreal and most of them can sail above the city to the Great Lakes. What changes has man made since Cartier's time to make this possible? A later French explorer, Champlain, also visited Montreal, and he too found that the rapids prevented him from going farther up the St. Lawrence.

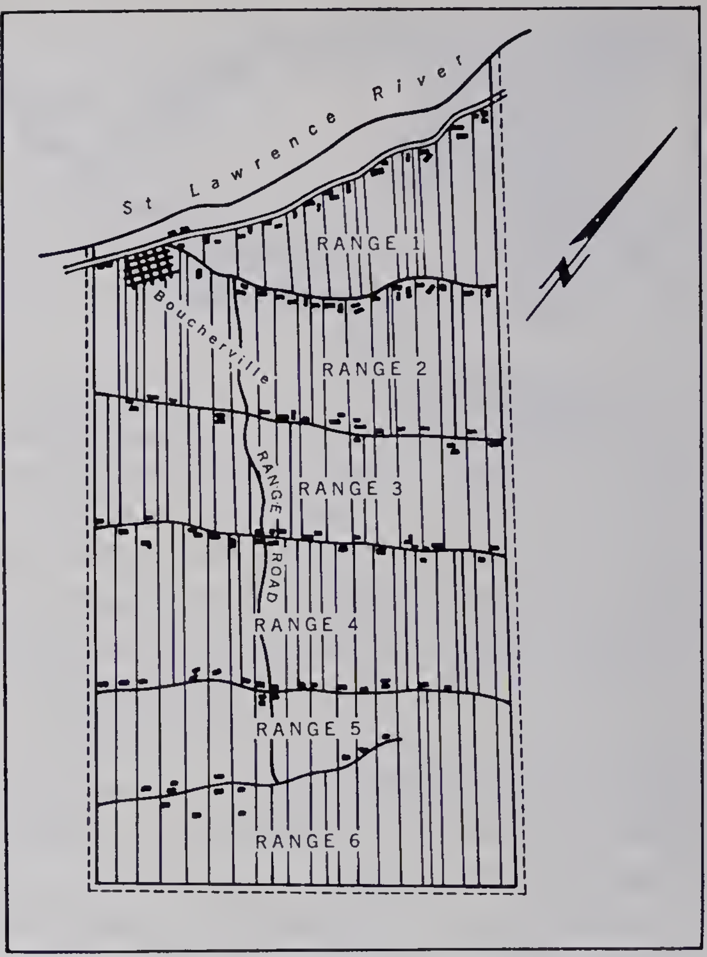
Study Figure 4-3. By which river did Champlain try to find another route to the west? This river had fewer dangerous rapids than the St. Lawrence. Champlain and others soon established a large fur trade with the Indians, which accounted for nearly two thirds of the colony's trade during the period of French rule.

Champlain is best known for having founded Quebec in 1608. For many years, this was the chief port and the largest town in Canada. Today, it is much smaller than Montreal, although it is still an important port, industrial city, and provincial capital. After the founding of Quebec, settlement in Canada grew, although slowly, and new towns such as Three Rivers and Montreal were established. The first farms in Canada were established in *seigneuries.* These were large grants of land made by the French king to men called *seigneurs.* A seigneur was expected to develop his land and to encourage people to settle on it. Figure 4-4 is a map of the seigneury of Boucherville, which was founded in 1668.

The early pattern of French settlement in Quebec and its effect on the landscape today

1. Where is Boucherville, according to Figure 4—13?
2. Each seigneury was divided into **ranges.** The first range was located along the riverfront.
(a) Describe the distribution of the houses, according to Figure 4—4.

4—4 The Seigneury of Boucherville



(b) Describe the location and shape of the fields. The fields were arranged in this way so that each farmer or habitant would have some frontage on the river. What would be the advantage of this? When a farmer died, his land was divided among his children. In this way, after many years, the farms which were at first half a mile or more in width, came to consist of very narrow, long fields. Many of the houses were of the type shown in Figure 4—1, although most were built of wood. Near the river, in a fairly central location, was the seigneur's house, the church, the school, and sometimes a mill which the seigneur often built.

3. As the land along the river became fully settled, more ranges were opened, away from the river.

(a) Describe the arrangement of the roads in the six ranges of the Boucherville seigneury.

(b) Another road, called a range road, is shown on the map. Describe its location and state what purpose it served.

4. Figure 4—5 shows the village of Verchères, along the St. Lawrence River near Boucherville. Locate it on the map in Figure 4—13. The photograph shows how the seigneurial system has influenced the pattern of settlement in Quebec down to the present day.

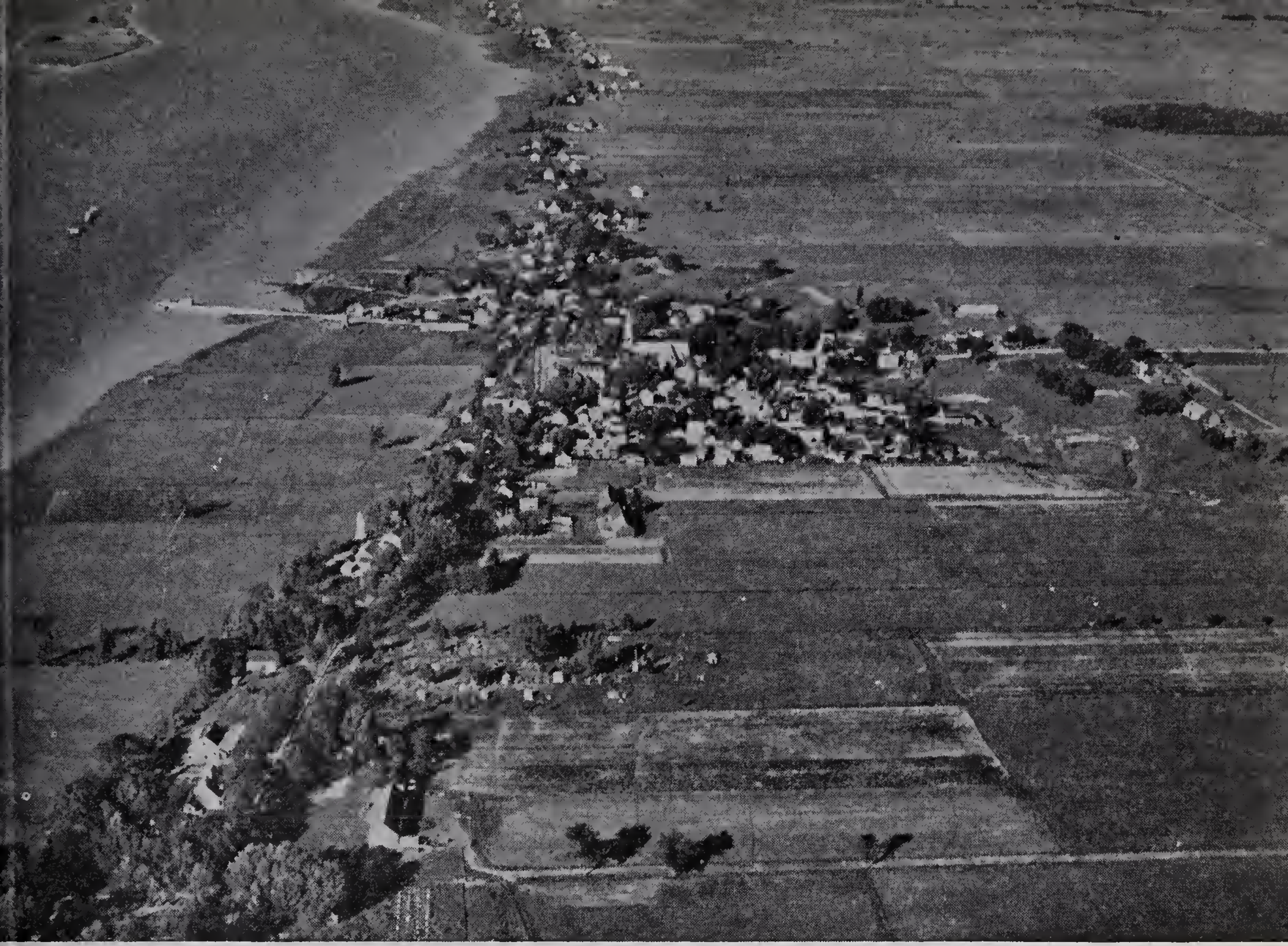
(a) In which direction was the camera pointing when this picture was taken?

(b) In what ways is this settlement like that shown on the map of Boucherville?

(c) Describe the relief of this land. How is most of it used?

(d) Where would the farmers there find a large market for their products?

5. From your studies so far, what seem to be the chief features of (a) the relief of the land, (b) the use of the land, (c) the villages, (d) the farms in the St. Lawrence Lowlands?

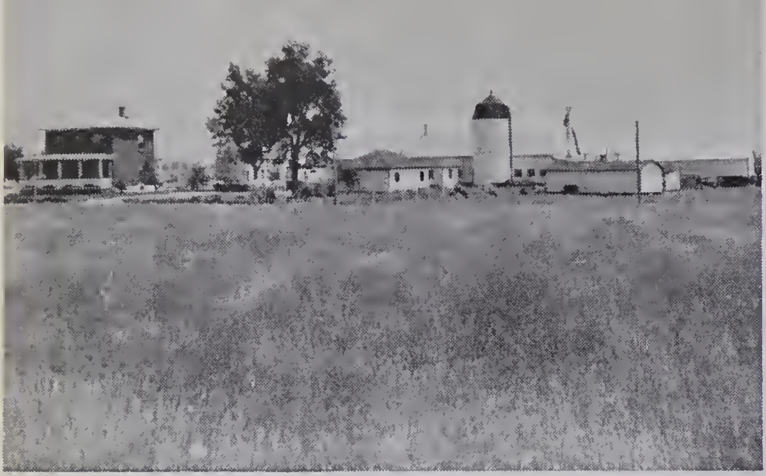


4—5 An aerial view of Verchères near Montreal (R.C.A.F. photo)

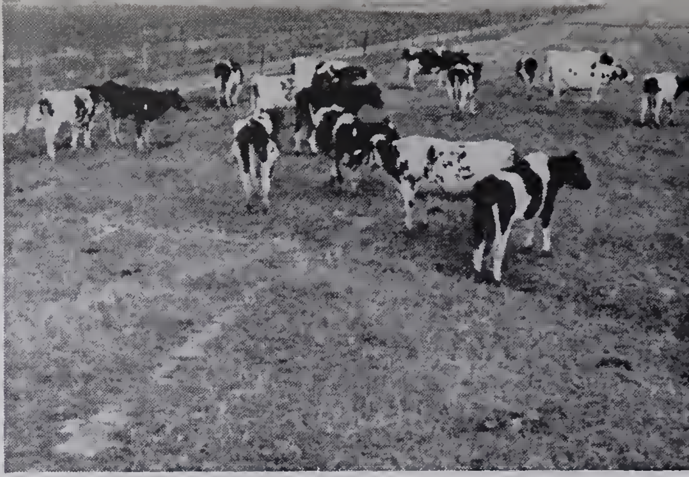
We shall now study a modern farm in the Lowlands, near Montreal. It is owned by Mr. Henri Brault.* Locate Mr. Brault's farm in Figure 4-13. In which direction from Montreal does it lie? How far is it from that city? Figure 4-6 is a picture of Mr. and Mrs. Brault and their family.

*This study of the Brault farm is based on material collected by Miss Joan Bostock of the British Association of Agriculture. The authors are indebted to Miss Bostock and the Association for permission to reproduce it here.

4—6 The Brault family in their home at Ste. Martine south of Montreal (Canadian Pacific Railway photo)



4—7 A general view of the Brault farm at Ste. Martine (Canadian Pacific Railway photo)



4—8 Mr. Brault's dairy herd grazes on one of the long, narrow pastures of the farm (Canadian Pacific Railway photo)

The main features of a modern French-Canadian farm near Montreal

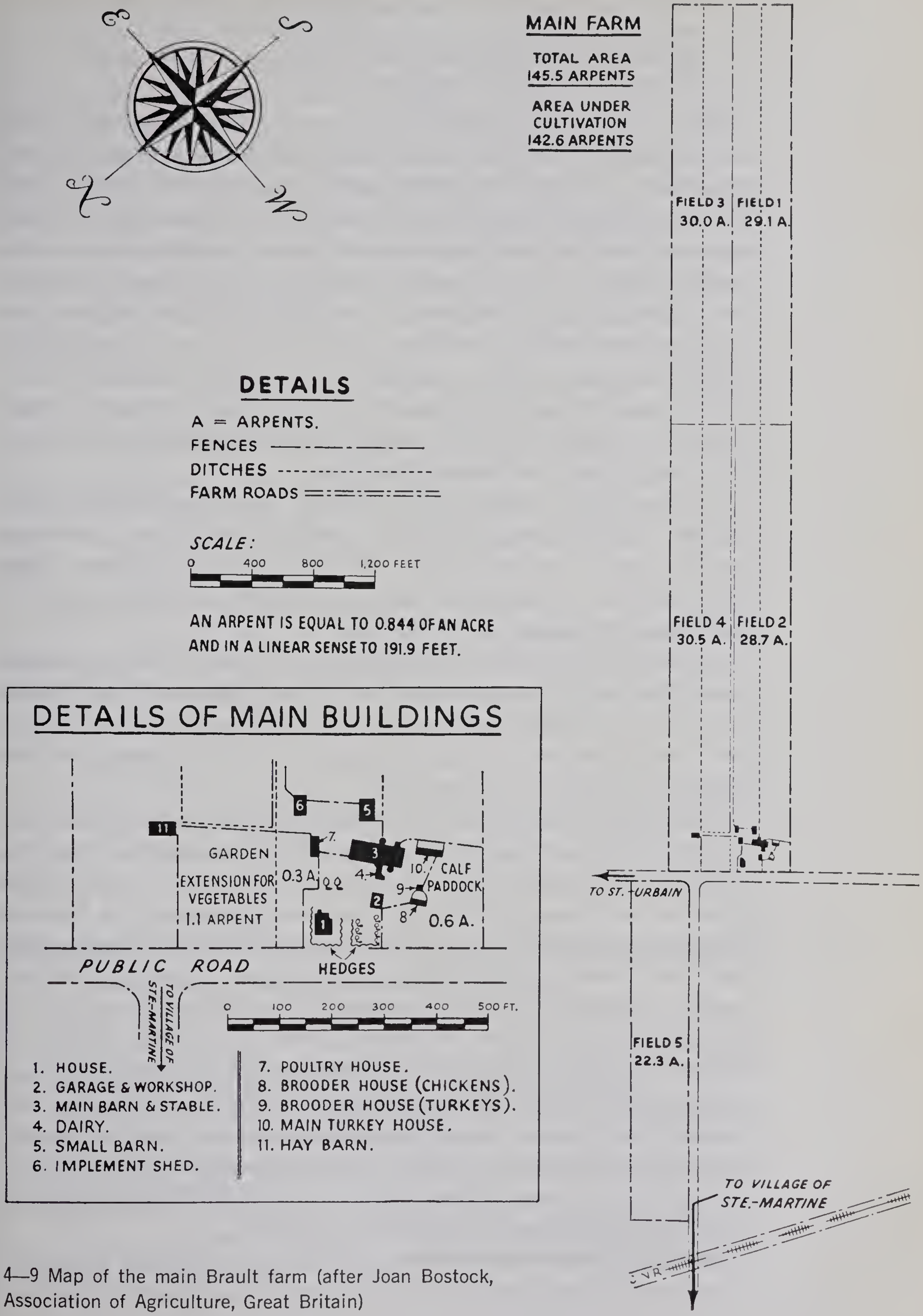
1. Figure 4—7 shows the farmhouse and other important buildings.
(a) What reasons can you find, in the picture, for believing that Mr. Brault operates a large and prosperous farm?
(b) What kind of farming is probably carried on there?
2. Figure 4—8 provides further information about the farm.
(a) Describe the relief of the land.
(b) Describe the shape of the fields. How do you know that this farm is probably in Quebec? How does it differ in shape from an Ontario farm?
3. Figure 4—9 is a map of part of the main farm. It shows 117 of the 140 **arpents** that make up this farm. An arpent is an old French-Canadian measure that equals about four fifths of an acre. Notice that nearly all Mr. Brault's land is under cultivation. He owns another farm close by, which totals nearly 120 arpents, or about 95 acres. What is the total acreage of Mr. Brault's two farms? In what ways is his farm like the old seigneurial farms that we studied earlier?
4. How are the drainage ditches shown in Figure 4—9? Nearly all farms in the St. Lawrence Lowlands require extensive systems of drainage. Explain why this is necessary.
5. Figure 4—9 shows the details of the main buildings. Use this map to help you to identify the buildings shown in Figure 4—7. State all the sources of income that the farm provides to Mr. Brault, according to this map.
6. Here is how the land is used on Mr. Brault's two farms in a typical year:

Main Farm

Field 1: Grass, clover, and alfalfa (for hay and silage).
Field 2: Grass, clover, and alfalfa (summer pasture for cattle).
Field 3: Sweet corn (5 arpents, sold to local cannery).
Ensilage corn (for silage, as winter feed).
Oats (20 arpents, sold for seed).
Field 4: Grass, clover, and alfalfa (hay, silage, and some pasture).
Field 5: Barley (10 arpents, sold for use in malting).
Oats (9.5 arpents, sold for seed).
Peas (2.8 arpents, sold for canning).

Second Farm

This farm is being developed for use by Mr. Brault's eldest son when he marries. Crops include: flax (5 arpents, sold for fibre); corn (5 arpents); oats and barley (16 arpents); oats (19.9 arpents); grass, clover, and alfalfa (72 arpents).



4—9 Map of the main Brault farm (after Joan Bostock, Association of Agriculture, Great Britain)

The fields of barley and oats are usually undersown with grass, hay, and alfalfa.

(a) Name the crops that use up most of the acreage on the farm.

(b) Name Mr. Brault's chief cash crops.

The chief source of Mr. Brault's income is his dairy herd which averages about 30 animals. Most of the milk is sold in Montreal, and production averages about 18,000 gallons per year. Mr. Brault maintains a very modern farm. The cattle are milked by machine in a well-equipped barn that has a fan to aid ventilation. It also has a mechanical manure remover which transports the manure to a place in the yard from where it can be distributed to the fields. All of the fields require manuring, and artificial fertilizers and lime must also be applied. In 1958 Mr. Brault installed a pipeline to carry milk from the machines directly into the large milk containers in the dairy. Automatic drinking cups are available to the animals, water being pumped by electricity from the main well under the house.

Mr. Brault has a great variety of other machinery, including two tractors, a truck, a car, a binder, a mower, a hay baler, a threshing machine, and a vertical blower (for blowing corn and grass silage into the silos). In addition there are at least 25 other pieces of machinery and equipment on the farm.

Mr. Brault sells eggs, table chickens, and broilers from his poultry breed. He keeps fewer poultry than formerly because Mrs. Brault, who looks after them, has less time available because of her work in the "Cercle Fermière," a local organization of farm women. For this reason, few turkeys are kept now.

The soils of the farm consist of fertile marine clays. These were deposited thousands of years ago when water covered the land. Old shorelines and fossilized sea shells have been found in and around Montreal and throughout the St. Lawrence Lowlands. It is believed that the sea covered the area towards the end of the last Ice Age. The land was pushed down by the great weight of the ice and rose again very slowly after the ice retreated. This allowed the sea to come in and to cover the area as shown in Figure 2-3. Some of the old shorelines may be seen today at elevations of 600 feet above sea level. Geologists have called this ancient body of water the *Champlain Sea.* Around Ste. Martine, where Mr. Brault lives, the land is generally only 100-200 feet above sea level; the soil is deep and fertile and there are no stones or rocks. What problems have already been noted that result from the flatness and the low elevation?

Providing winter feed for the cattle is a major problem facing Mr. Brault and all farmers in the St. Lawrence Lowlands. The animals must be kept indoors about six months of the year. In 1956, for example, the animals could not be put out to pasture until May 20. An unusually long and cold winter was followed by a wet spring, during which the ground was too soggy for grazing or for sowing crops. During the same year, sowing was delayed for nearly a month, until June 10. The frost-free period around Ste. Martine averages 133 days, but may range between 120 and 150 days. This is a somewhat shorter period than at Montreal. Precipitation averages about 31 inches a year, which includes about 100 inches of snow. Although short, summers are hot and quite humid. Droughts are possible, however, and, in 1955, Mr. Brault reported nearly two months in a row without rain.

Ste. Martine is located in Chateauguay County, one of the richest dairy counties of Quebec. Most of the people are French-speaking, although many farmers are descendants of British settlers who settled there more than a century ago. Mr. Brault's ancestors came from Britanny, in France, around 1750. His grandfather came to live near Ste. Martine in 1868. The present farm was purchased by Mr. Brault's father in 1908.

As in the Niagara Peninsula and other farming areas near large Canadian cities, farmland is being sold for housing. Around Ste. Martine and other towns in Chateauguay County, hundreds of new houses have been built in recent years. Thousands of people have moved from the Montreal region to take up suburban life. Most of them continue to work in or near Montreal.

The part of the St. Lawrence Lowlands that we have been studying so far is called the Montreal Plain. Further views of this plain are supplied by Figures 4-10 and 4-11 which show the Mount Johnson area.

A topographic map of the Montreal plain and a vertical aerial photograph

1. (a) What is the contour interval of the topographic map?

(b) Describe the relief of the land between Mount Johnson and Marieville.

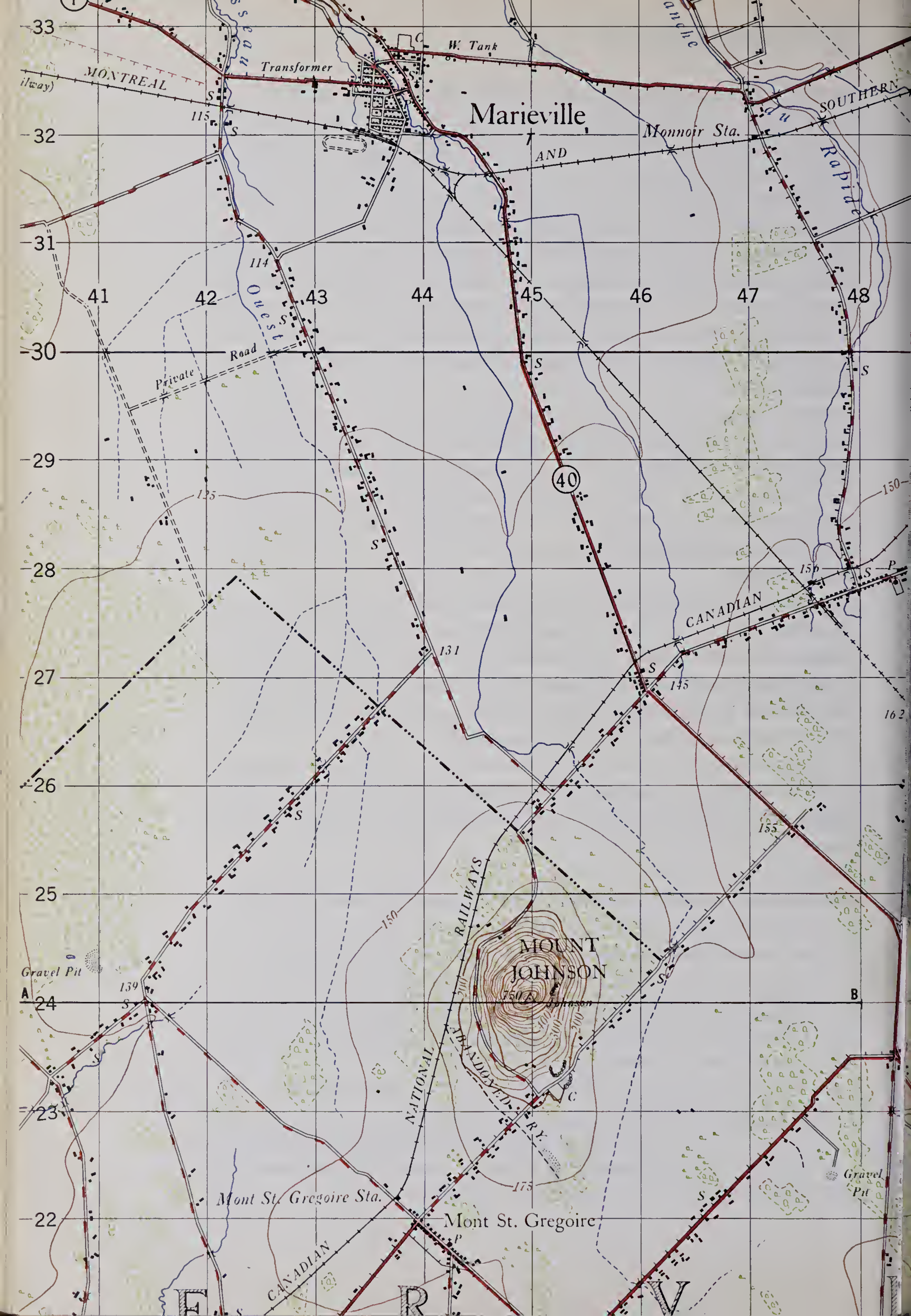
(c) Describe the field pattern of the farms as revealed by the photograph. Explain the origin of this pattern. Compare it with that studied in Figure 4—5.

(d) Describe the distribution of settlement as revealed by the map.

(e) Name the most important settlement shown on the map. Suggest reasons to account for the importance of this settlement.

(f) Marieville lies due east of Montreal. Which road would you take to travel to that city from Marieville?

(g) Compare the density of rural settlement in the area covered by this map with that of the Banff area shown in Figure 8—13. What reasons might account for the fact that the Montreal Plain is one of the most densely populated rural areas in Canada?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750 Ft. Johnson
NATIONAL RAILWAYS
ABANDONED RY.
Gravel Pit
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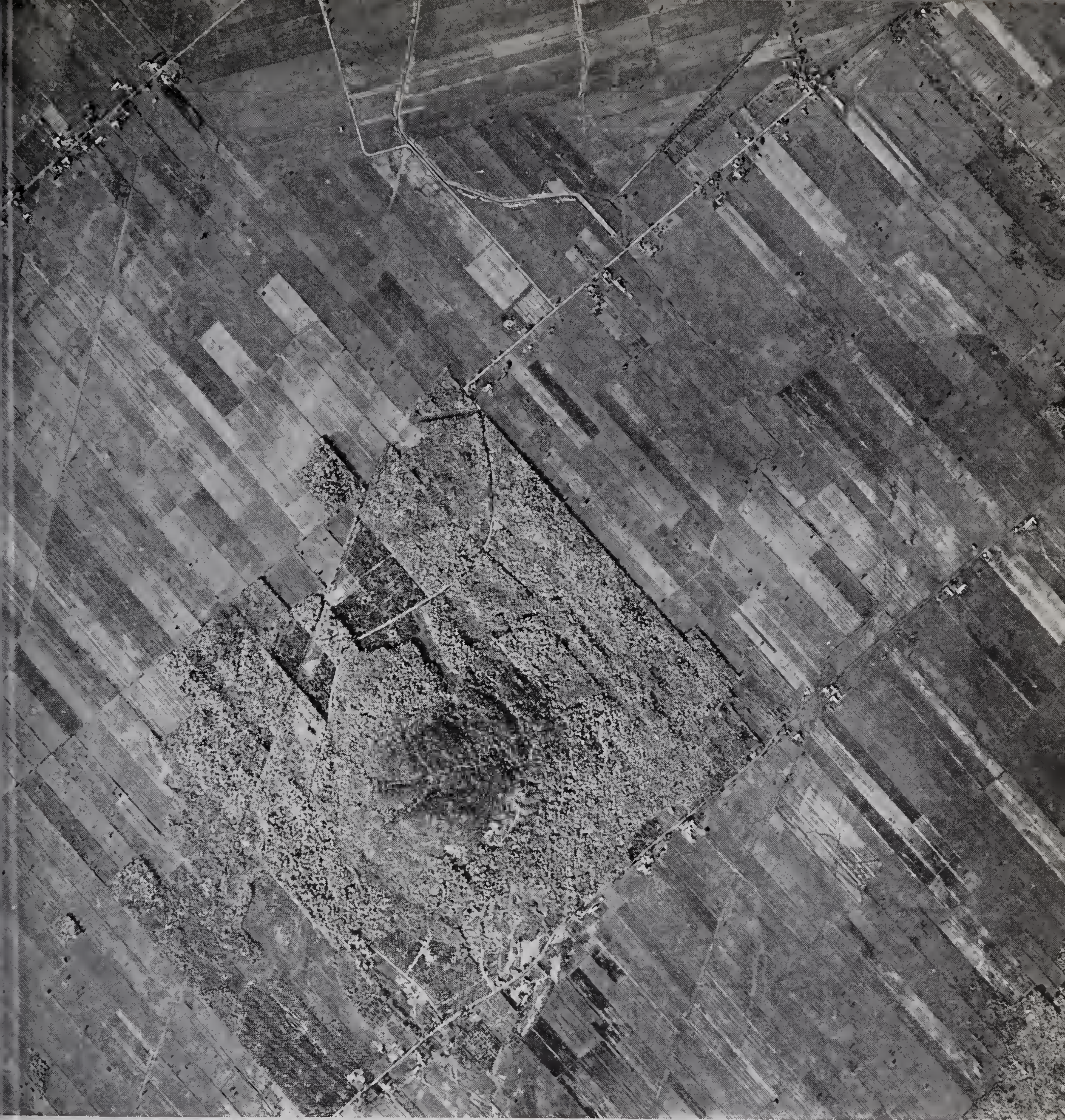
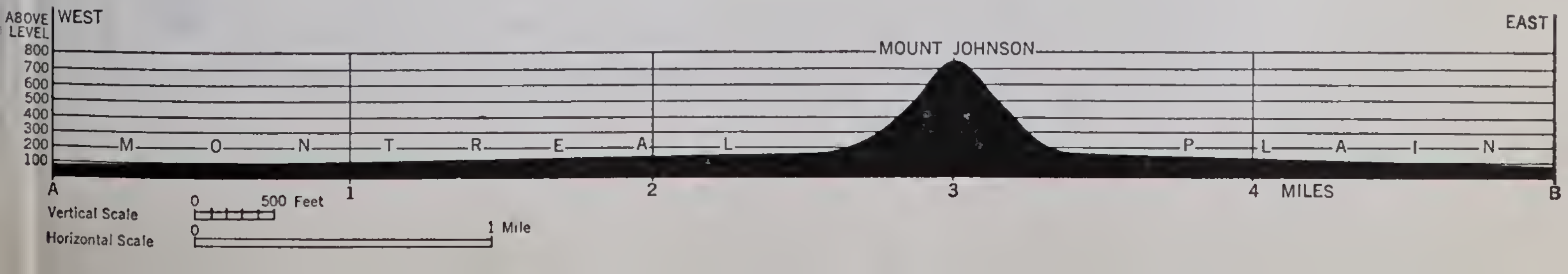


4—11 Mount Johnson area (R.C.A.F. photo)

4—10 (opposite) Topographic map in the scale of 1:50,000 of the Mount Johnson area in the Montreal Plain (from the St. John sheet 31 H/6 East Half, National Topographic Series)

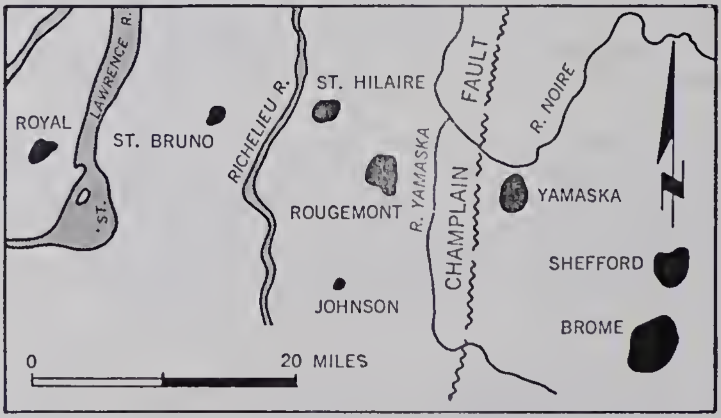
The diagram below shows a profile or cross-section of Mount Johnson along the line AB on the map. The line extends a distance of about five miles. At every point where it crosses a contour line, a dot was marked on the graph, opposite the elevation of the line. All the points so marked were joined and the profile area was shaded as shown. The result gives a good idea of the shape of Mount Johnson. The vertical scale was much larger than the horizontal scale; otherwise, the mountain would scarcely show at all.



2. Study Mount Johnson, the most prominent relief feature of the area. Locate it on both map and photograph.
(a) What effect has the mountain had on the road pattern?
(b) What is the elevation of the road that crosses the southeastern edge of Mount Johnson?
(c) What is the elevation of Mount Johnson?
(d) Estimate the distance from the water tank at Marieville to Mount Johnson. Describe the appearance of the mountain as it would be seen by an observer standing at this point.
(e) How does the map show the shape and slope of Mount Johnson? (See profile at the bottom of page 145.)
(f) Assuming that the 175-foot contour is the base of the mountain what is the approximate area of Mount Johnson?
3. (a) What does the photograph tell that the map does not reveal about the agricultural land use of the area?
(b) What do you notice on the map about the location of the wooded areas in relation to the farms? Account for the wooded area that surrounds Mount Johnson.
(c) What source of building material is available in the area?
(d) What is the scale of the map? Is this larger or smaller than the scale of the photograph?
4. Study Figure 4—12 which shows a famous group of hills in the St. Lawrence Lowlands near Montreal. St. Hilaire Mountain is the highest of these.
(a) How many such hills are there altogether?
(b) In which direction do they extend from Montreal?
(c) Which one is on the island of Montreal? Find this hill in Figure 4—12. An observer standing on the hill looking east can, on a clear day, see several of the other hills from Montreal. Study Figure 4—19 which was taken from Mount Royal. How many hills can you see in this photograph?

All eight hills that we have just noted are called the Monteregian Hills. This term comes from the Latin name for Mount Royal. These hills are often called mountains, although none reaches 1400 feet in elevation. However, they stand out very sharply against the skyline of the extremely flat St. Lawrence Lowlands Plain. The Monteregian Hills were formed from hot, molten material that worked its way through the soft, horizontal rock strata of the plain. There, it cooled and hardened into a solid mass. As the soft strata were worn away over millions of years, the hard rock was exposed in a series of hills.

4—12 Distribution of the Monteregian Hills



On the Monteregian Hills are grown many of Quebec's apples. The province usually ranks second or third in apple output in Canada. As we mentioned in our study of Mount Johnson, the orchards are located on the slopes of the Monteregian Hills. How does this help to protect the fruit trees from frost? If necessary, refer back to page 31 of Chapter 2 in answering this question.

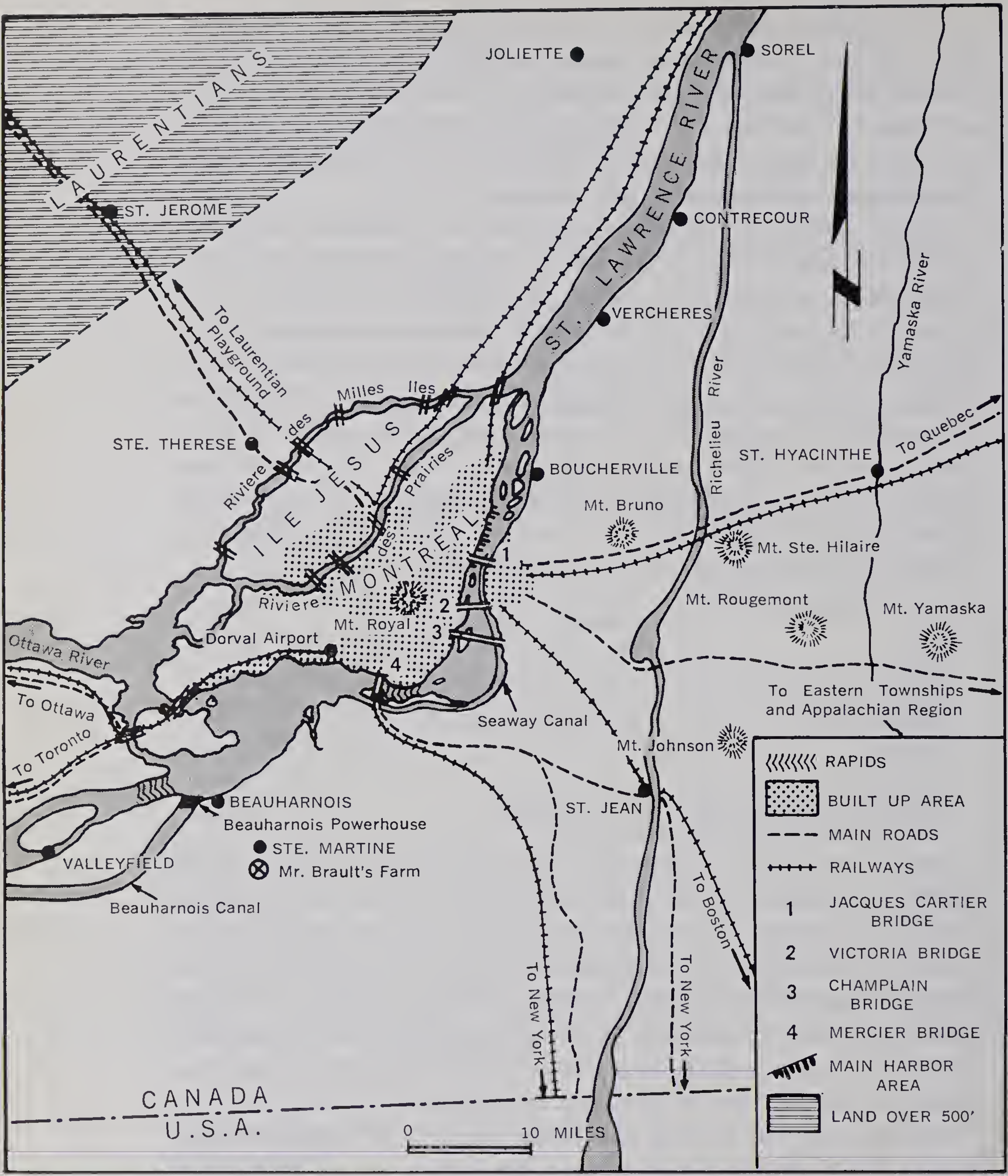
Besides apples, various small fruits such as raspberries and strawberries are raised in the St. Lawrence Lowlands. Market gardening, especially the raising of vegetables for canning, is important, as we noticed in the study of Mr. Brault's farm. Dairying is important everywhere, and Quebec is Canada's chief producer of butter. Poultry farming and the cultivation of potatoes, tobacco, and sugar beets are other major sources of farm income. Mixed farming is the rule. A brief description follows of a small farm of 87 acres on rather poor, sandy soil north of Montreal. The farm includes 16 acres of unimproved land which comprises a woodlot with a maple bush. The 71 acres of improved land are used as follows:

Cigar (air-cured) tobacco	3	acres
Oats	20	acres
Clover	20	acres
Timothy hay	11.5	acres
Turnips	1.25	acres
Permanent pasture	13.5	acres
Vegetable garden, fruit trees, buildings	1.75	acres

How many acres are devoted to forage crops? Hay and pasture together require 25 acres, or more than one third of the improved land. This represents the chief form of land use on most Quebec farms. Compare land use on this farm with that on Mr. Brault's farm. An important difference is the acreage devoted to tobacco. Although only three acres are involved, these acres produced, in a recent year, $1107 in revenue, which was more than ten percent of the total revenue from the farm. In that year, 11 milk cows, 5 heifers, 4 calves, 7 sows, 65 pigs, 193 broilers, and 180 laying hens were kept. In addition to $1107 revenue from tobacco, the farmer earned $6529 from hogs and $1084 from cream. This farm, like Mr. Brault's, is a true mixed farm.

Montreal — Canada's Metropolis

We have already learned that the early French explorers found it impossible to navigate the St. Lawrence River above Montreal. Study Figure 4-13 and locate the rapids that barred their way. Just below



4—13 The Greater Montreal Region

Montreal, the St. Lawrence is very shallow. For these two reasons, Quebec was for many years a much more important port. Even after the invention of the steamship, the river current was so dangerous that the first small steam vessels to come to Montreal had to be towed into their berths by teams of oxen. For many years, a towpath was maintained along the riverfront at Montreal Harbor. However, after 1830 Montreal began to grow as a port and industrial centre and in time it became Canada's greatest port, chief manufacturing centre, and largest city. It is now necessary to find out why Montreal has grown so remarkably.

As usual, history gives us much of the answer to our question. Between 1784 and 1821, Montreal was the chief centre of the fur trade in Canada. The famous Beaver Club was the social centre of the city. To be a member of this club, a man must have spent a winter in the far west. The furs gathered there were brought to Montreal by canoe. There they were placed on board vessels and shipped to Europe where beaver fur especially was in great demand. Thus, Montreal early became a *trans-shipment point* — that is, a place where goods such as furs were transferred from one means of transportation (canoes) to another means (sailing vessels). Several of the city's early fortunes were made in the fur trade. One of the best known of these was that of James McGill who gave the money and land to begin McGill University. Wealth thus accumulated was also used to establish the first industries. Canada's first bank was established there in 1817 and Montreal is today the headquarters of Canada's largest chartered banks.

In Chapter 2, we studied the St. Lawrence Seaway in detail. Review this material on pages 20-26. The first attempt to overcome the rapids of the St. Lawrence took place at Coteau-du-Lac, west of Montreal, in 1781. Study Figure 2-5 again. After 1800, the people of Upper Canada (Ontario) began to produce and sell large quantities of lumber and wheat. These products were shipped to England and other European countries via Montreal and Quebec.

In 1830, the Montreal Harbor Commission was formed. It improved navigation by dredging the river below the city and by installing proper docks and other facilities. At about the same time, the Lachine Canal was opened. By 1850, this canal had been deepened to nine feet. By this time, a system of such canals connected Montreal with the Great Lakes. Soon, important trans-atlantic steamer services were established. Montreal is now Canada's chief port for passenger vessels on the Atlantic route to Europe.

As Montreal's trade developed, industries based on the goods moving into the port began to grow. In 1856, flour mills and a large sugar refinery were built near the harbor and remain important industries.

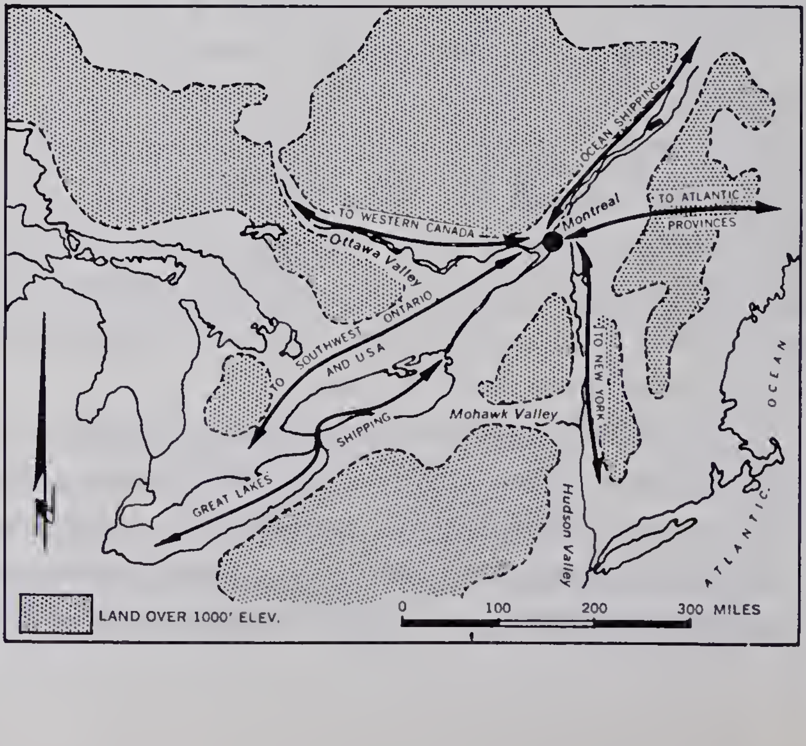
Another important event in Montreal's history was the opening of Canada's first railway in 1837. This line, only 14 miles long, became a

4—14 The great C.N.R. sorting yards at Montreal (Canadian National Railways photo)

link in the connection between Montreal and New York. Study Figure 4-14 which shows the great C.N.R. "hump yard" at Montreal. There, freight and passenger cars are sorted, and new trains "made up." The C.P.R. also has a huge hump yard at Montreal. The city is the headquarters of Canada's two chief railway systems.

Montreal is Canada's greatest transportation centre. Figure 4-13 shows Dorval Airport which is one of the nation's chief air terminals. In which direction from Montreal does it lie? Although its highway network is less extensive than that of Toronto, roads extend from the city in all directions. Figure 4-15 shows Montreal as a focus of valley

4—15 Montreal as the focus of valley routes



routes. Study this map and state the valley routes that you would follow on automobile journeys, from Montreal to Ottawa, Quebec, Toronto, and New York.

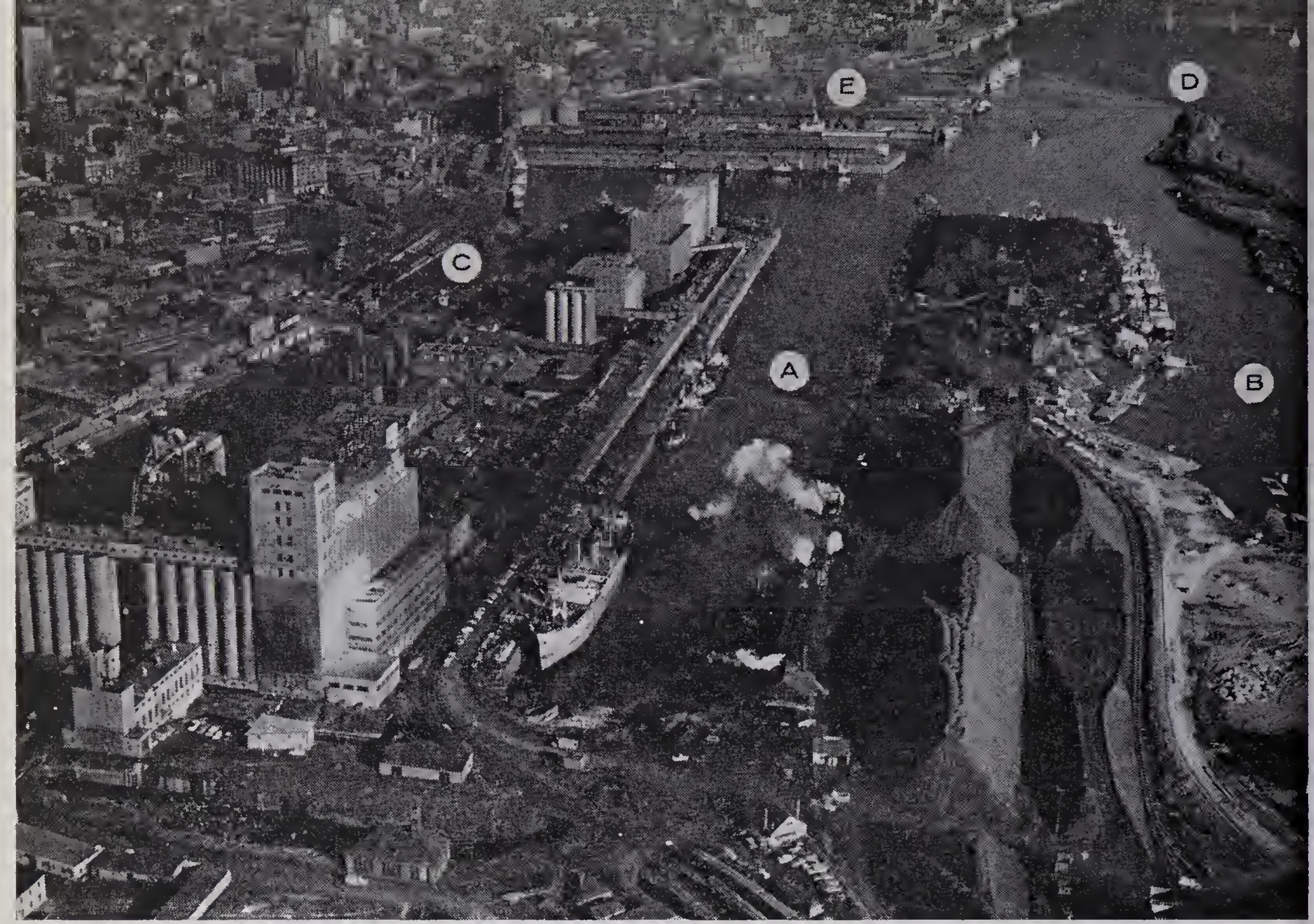
Montreal Harbor from a photograph and a large-scale map

1. Figure 4—16 provides an aerial view of much of Montreal Harbor.
(a) Does this appear to be a busy port? Give reasons for your answer.
(b) What evidence is there in the photograph that Montreal is an importer of coal and grain?
2. Study the photograph in conjunction with the map in Figure 4—17.
(a) Identify the basins labelled A and B in the photograph. What is their maximum depth?
(b) The channel to the left of Windmill Point Basin in the photograph includes the first lock of the old Lachine Canal. These locks are only 14 feet deep. How deep is the St. Lawrence Seaway which was built to provide a deeper channel? In which direction was the camera pointing when Figure 4—16 was taken? In which direction is the Seaway Canal located? Figure 4—13 may answer this question.
3. (a) Name the group of three piers labelled E in the photograph. How deep is the channel there, according to the map? This is the maximum depth of Montreal Harbor. This channel to Quebec is kept open only by constant dredging.
(b) Which letter in the photograph identifies the swift current of the St. Lawrence? There, outside the dredged areas, the channel is very shallow. In some cases, it is less than ten feet deep.
4. Study the background of Figure 4—16. Use the map in Figure 4—13 to identify the bridge. Describe the relief of the land in the far distance. This is typical of the St. Lawrence Lowlands.

The harbor of Montreal extends to the opposite shore. Many of the installations there are part of the St. Lawrence Seaway. On the Montreal side of the harbor, there are 131 shipping berths, 12 miles of berthing accommodation, and 4 grain elevators, 62 miles of railway track, a huge cold storage warehouse, and an immense drydock. In addition to these features, the large-scale map of the harbor on which Figure 4-17 is based indicates the following industries:

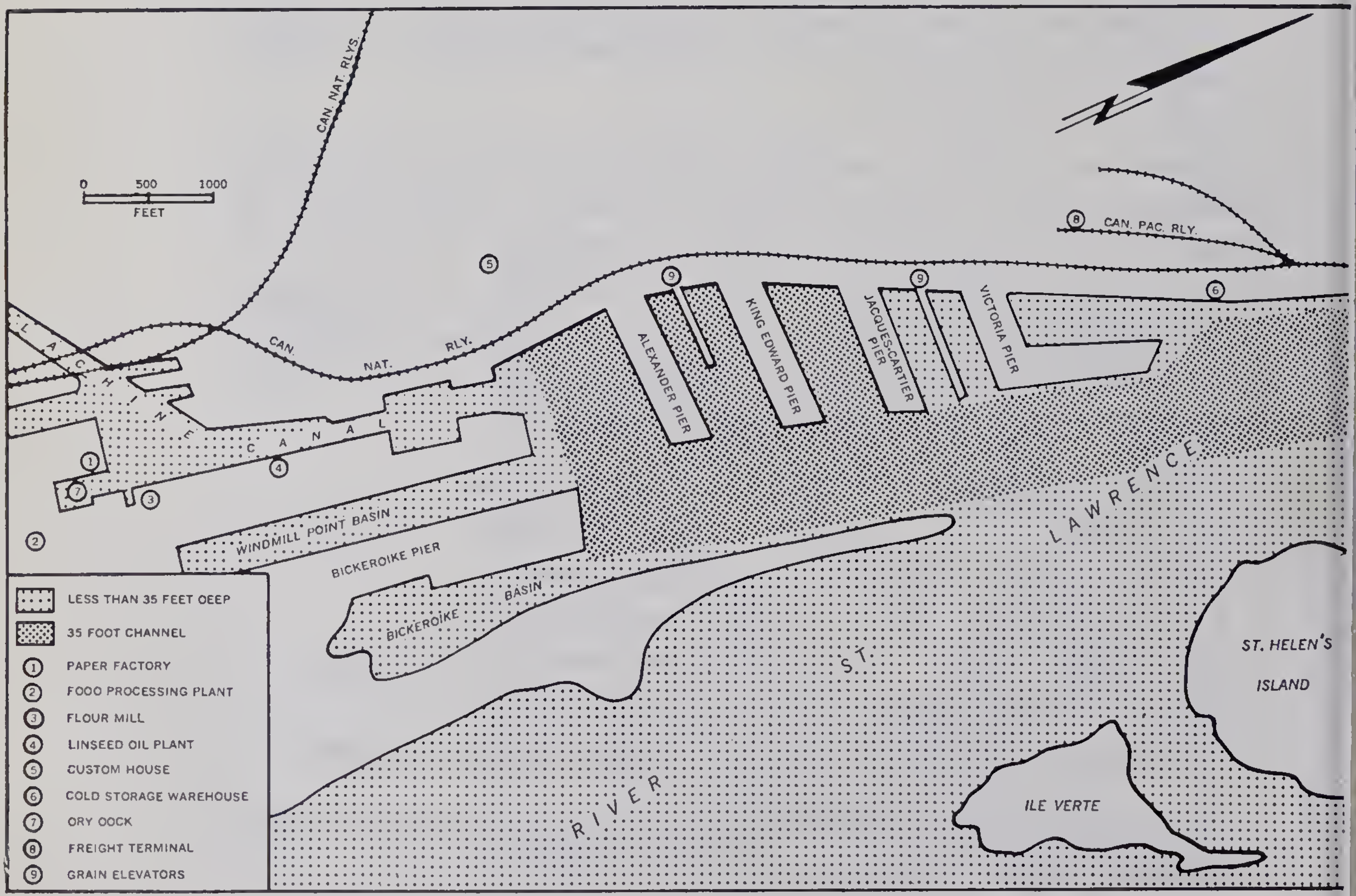
Meat-packing plants
Flour mills
Two linseed oil plants
A large brewery
Oil refineries
A salt-processing plant
Food products plants
A rubber factory
Two textile mills
Sugar refineries
A molasses factory
A commercial alcohol plant
Chemical plants
A gypsum-processing plant

The following table indicates the chief goods handled by the Port of Montreal in 1959, in order of volume:



4—16 View of the main part of Montreal Harbor (National Harbors Board photo)

4—17 Map of part of the area shown in Figure 4—16



Outward	*Inward*
Wheat	Wheat
Petroleum oils	Petroleum oils
Gasoline	Crude petroleum
Grains (other than wheat)	Gypsum
Cement	Sugar
Flour	Sand, gravel, and stone
Iron and steel scrap	Coal
Chemicals and chemical products	Chemicals and chemical products
Coal	Iron and steel bars
	Auto, trucks, and parts

The port of Montreal handles goods in four ways:

(a) Some goods are received from Ontario and Western Canada and are immediately shipped out. This is Montreal's *trans-shipment* function. This has declined somewhat because, with the opening of the deep 27-foot St. Lawrence Seaway Canals, goods can often be shipped directly overseas on ocean vessels that do not need to transfer their cargoes to larger vessels at Montreal.

(b) Other goods are received from overseas and are distributed throughout Quebec and to other parts of Canada. This, too, is a trans-shipment operation with goods often being transferred to vessels that take them through the Seaway, or to trucks and freight trains that carry them to various places.

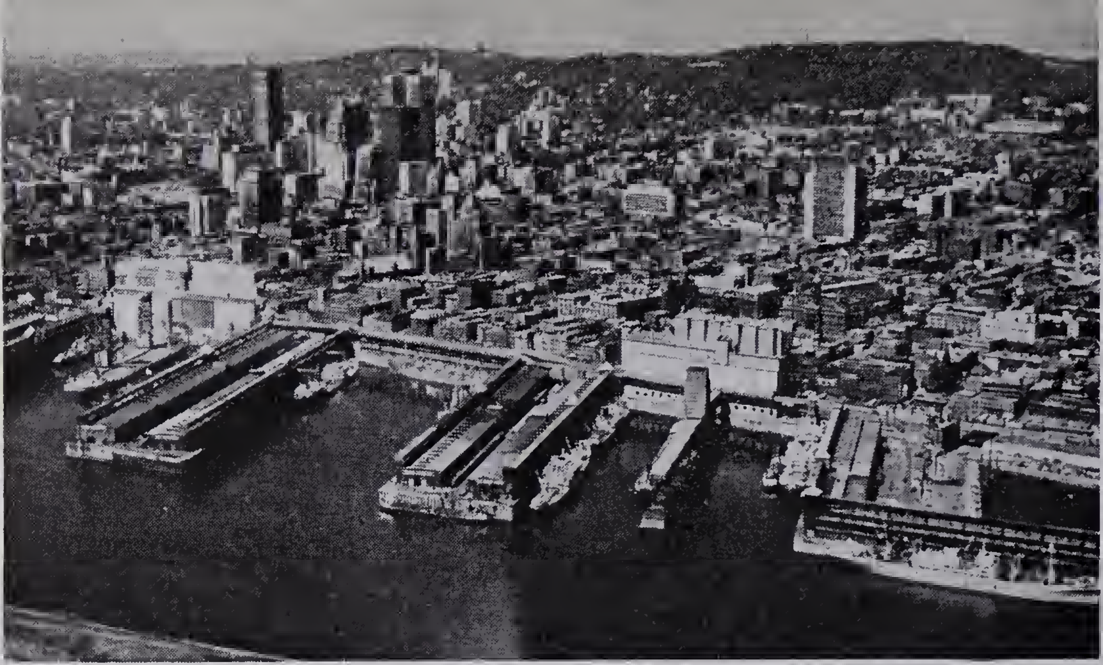
(c) Some goods are processed at Montreal before being sent elsewhere.

(d) Vast quantities of goods that reach Montreal are distributed throughout the city and nearby areas, sometimes being processed first.

Many, probably most, goods are handled in several of the ways described. For example, some wheat from the prairies is immediately shipped overseas. Some of it is processed into flour before being shipped elsewhere. Much of it is processed and kept in Montreal to meet the great local need for bakery products.

A further study of Montreal and its neighboring landscape

1. Study the list of industries given previously. Name at least one raw material that would be used by each industry and suggest where this raw material might be obtained.
2. Very carefully study the list of goods handled by the port. Which inward commodities in this list supplied the raw materials from which many of the outward-bound goods were made? Select three goods from the list and show how each might have been handled in three of the ways suggested above.



4—18 Looking towards Montreal from the harbor (Armour Landry photo)

3. Figure 4—18 shows some of the piers already identified in Figure 4—16. Large ocean liners discharge and take on passengers here.
(a) What is the name of the long, low hill in the far distance? Between the harbor and this hill, the main business, commercial, and shopping areas of Montreal have grown.
(b) In which direction was the camera probably pointing when the picture was taken? Figure 4—13 may help you to answer this question.
4. Figure 4—19 was taken from Mount Royal, looking towards the river. It shows three of the tallest buildings in the British Commonwealth.
(a) In which direction was the camera pointing?
(b) Study the far shore of the St. Lawrence River. Describe the relief of this land. What name is given to the hills that can be seen in the far distance?
(c) The harbor area is to the left. Try to locate one or two bridges in the picture. Refer to Figure 4—13 again and note how many bridges connect Montreal to the mainland.

The greatest single handicap faced by the Port of Montreal is the severe winter climate. From the study of Mr. Brault's farm, describe the chief features of this climate. The following statements from news stories in the Montreal newspapers during the winter of 1961-62 will tell you much about the climate and its effect on life.*

November 30, 1961 Headline:

SNOW ENDS, CITY STARTS TO DIG OUT

The story under this headline stated:

> "The storm is over and Montreal is digging out from under 14 inches of snow. Today was expected to be cloudy with a few sunny periods—and no snow. Dorval weathermen forecast a high of 30°. Cooler air was due to move into the area tonight with a forecast low of 15°.
>
> Early morning traffic today was still running slower than usual through streets narrowed by banks of snow on either side, but no serious delays in

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*The extracts from news stories are reproduced here through the courtesy of the Montreal *Daily Star*.

4—19 The main part of Montreal from Mount Royal (George Tomkins photo)

> bus schedules were reported. . . . (Another report of the same day revealed that the Montreal Transportation Commission had 11 tow trucks, each equipped with a two-way radio, to assist getting stalled buses back into action.)
>
> Overnight, the city had about 1700 men and 700 pieces of equipment on the streets to clear them of snow."
>
> **December 1, 1961:** "The 22,000 ton 'Ivernia' is outward-bound on her twelfth and final voyage of the season from Montreal. She left here yesterday and was the last passenger liner to leave the port."

February 1, 1962 Headline:

INTENSE COLD TIGHTENS GRIP ON MONTREAL . . .
DORVAL REPORTS 24 BELOW, NO RELIEF BEFORE SATURDAY

The news story added:

> "Cold weather records were shattered across the province this morning as an Arctic weather system tightened its grip on the eastern section of the continent. . . .
>
> There were no readings above zero in the various districts around Montreal today.
>
> The official thermometer at Montreal Airport gave a reading of 24 below at 8 a.m. This was the coldest temperature for the date in more than forty years. . . .
>
> The bitter cold turned everything to iron. Automobiles groaned reluctantly when starters were pressed. . . . Although all streets were cleared of snow, traffic moved slowly on ice-hard and slippery surfaces. . . .
>
> The weatherman warned that exposed flesh will freeze today within a matter of seconds. . . .
>
> Current sub-zero weather has brought icebreaking operations on the St. Lawrence River to a virtual standstill, channel engineers reported today. New ice is forming so rapidly that the icebreakers have barely been holding their own this week. . . .
>
> Last weekend, the icebreakers had progressed a few miles above Sorel towards Montreal, but were forced to turn back when the severe weather conditions threatened to freeze newly-opened channels behind them."

March 8, 1962: "The icebreakers . . . cracked through the last ice barrier to Montreal's inner harbor. . . . Several basin approaches to wharves and the channel entrance to the St. Lawrence Seaway have to be cleared following yesterday's opening. . . .

Once the cleanup jobs have been completed here, the icebreakers will then stand by until the spring breakup of shore ice which will cause new jams and may delay shipping for a few days as in the past."

(Later stories told of the arrival of a Danish freighter, reinforced against ice, on March 12th, the earliest opening in the history of the Port of Montreal.)

Why is the climate Montreal's greatest problem?

1. (a) What is the record snowfall for one day in your neighborhood? Compare this with Montreal's 14-inch fall on November 30, 1961. Falls of ten inches are quite common at Montreal.

(b) Note the high and low temperatures at Montreal on November 30, 1961. If you can obtain information from your nearest weather office on the normal high and low temperatures for this date where you live, compare these with the 1961 figures for Montreal.

2. (a) Describe the effects of a severe winter on everyday life in Montreal.

(b) Describe some of the means used to combat such a storm. In some years, the city's budget for snow removal exceeds $8,000,000.

3. Describe some effects of severe cold during a Montreal winter. The record low temperature at Montreal is 29 below. How does this compare with the record low where you live?

4. (a) For approximately how many weeks was the Port of Montreal closed during the winter of 1961-62? About what fraction of the year was this?

(b) Name two important Canadian ports, one on the Atlantic Coast and one on the Pacific Coast, that would have an advantage over Montreal by being open all winter.

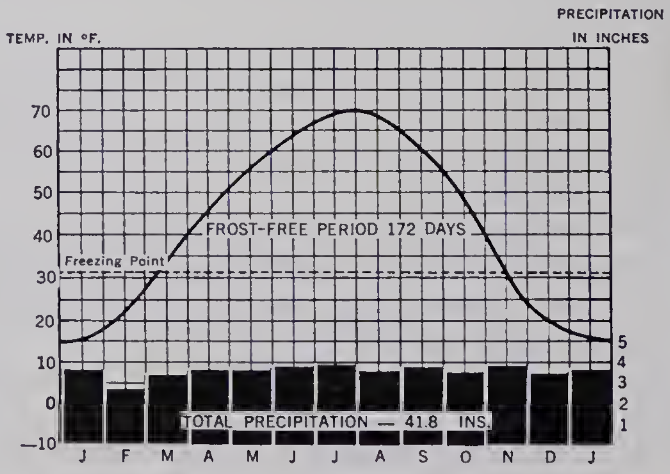
(c) Why is ice still a problem, even after the channel has been opened?

5. Study Figure 4—20 carefully. This is a climatic graph of Montreal.

(a) For how many months of the year is the average temperature below freezing? Compare this with the situation in your neighborhood. Compare the temperature of the coldest month (January) at Montreal, with the January temperature where you live.

(b) What is the July average temperature at Montreal? Again, compare this with the July conditions in your home region. Montreal's summers are fairly

4—20 Climatic graph of Montreal



short, but quite hot. In a heat wave, the thermometer may reach over 90°F. for several days in a row. Usually, such days are also humid and sticky.
(c) What is the total precipitation at Montreal? Again, compare this with conditions where you live. Comment on the distribution of precipitation throughout the year. In summer, thunderstorms are fairly frequent, an average of a dozen or more occurring during the three warmest months. Most of the winter precipitation is in the form of snow. Normally Montreal obtains between 100 and 120 inches of snow during a typical winter. Few large cities in the world receive more snow. How much snow does your home area receive?
6. Make a list of the various ways that Montreal's severe winter climate increases the cost of living in comparison with costs in a city such as Miami, Florida. Think also of some ways in which life in the two cities would differ greatly as a direct result of the climate.

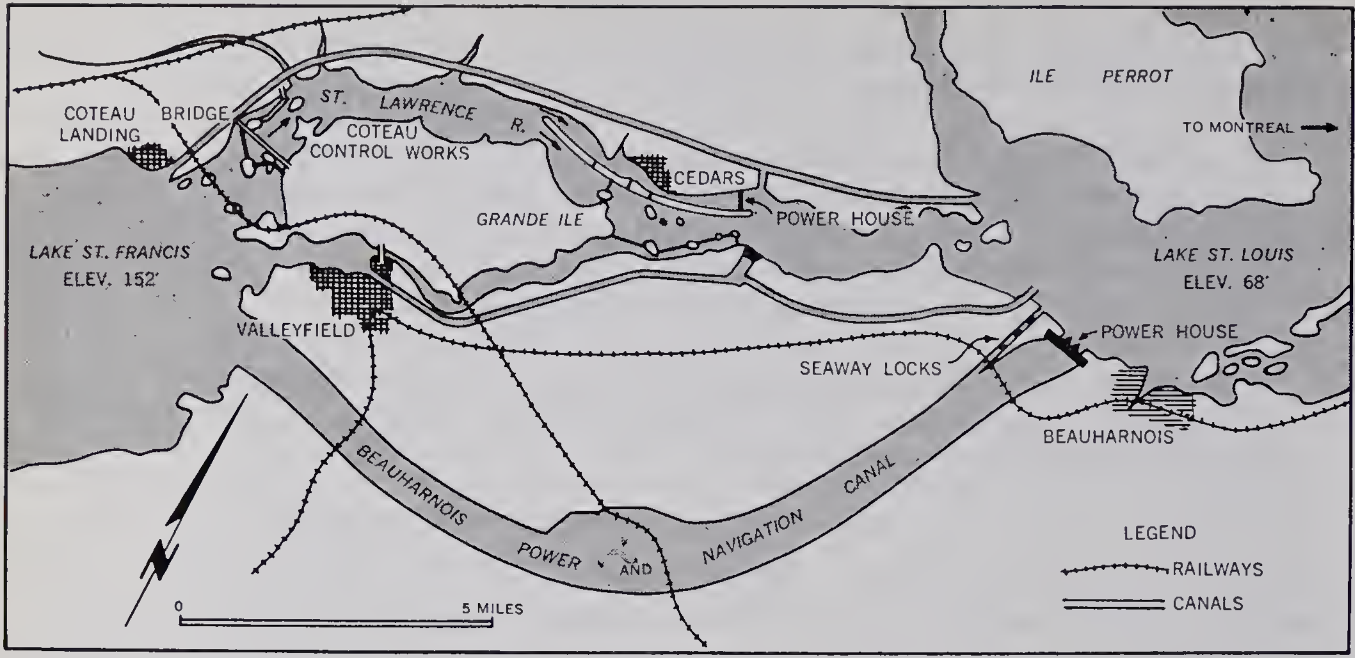
A large industrial city like Montreal requires vast quantities of power and energy. We have already noted that coal and oil are imported. Both water and rail facilities are used to bring these fuels to Montreal. Oil is also brought in by pipeline. In winter especially, when the port is closed, the oil pipeline from Portland, Maine, to Montreal is important as a means of bringing oil to Montreal from Texas, Venezuela, and other areas.

Refer back to Figure 2-39. This shows clearly that Montreal is the largest oil-refining centre in Canada. Locate the pipeline from Portland. Since 1959, natural gas has been reaching Montreal from Alberta. Is it not amazing to think that Montreal housewives are now able to cook their family dinners using gas that has travelled 2500 miles to their kitchens?

All electricity used in Montreal is produced by water power. No other large city in the world has such huge hydro-electric resources at its command. The St. Lawrence and the rivers of the nearby Canadian Shield supply the water power. There are still large unused resources. The largest of these is Lachine Rapids which may some day be harnessed to take light to the homes and power to the factories of Montreal. Only 20 miles west of Lachine is one of the largest producers of electricity in the world. Locate Beauharnois in Figure 4-13. A large-scale map of this development is shown in Figure 4-21.

Beauharnois — and other sources of Montreal's electrical energy

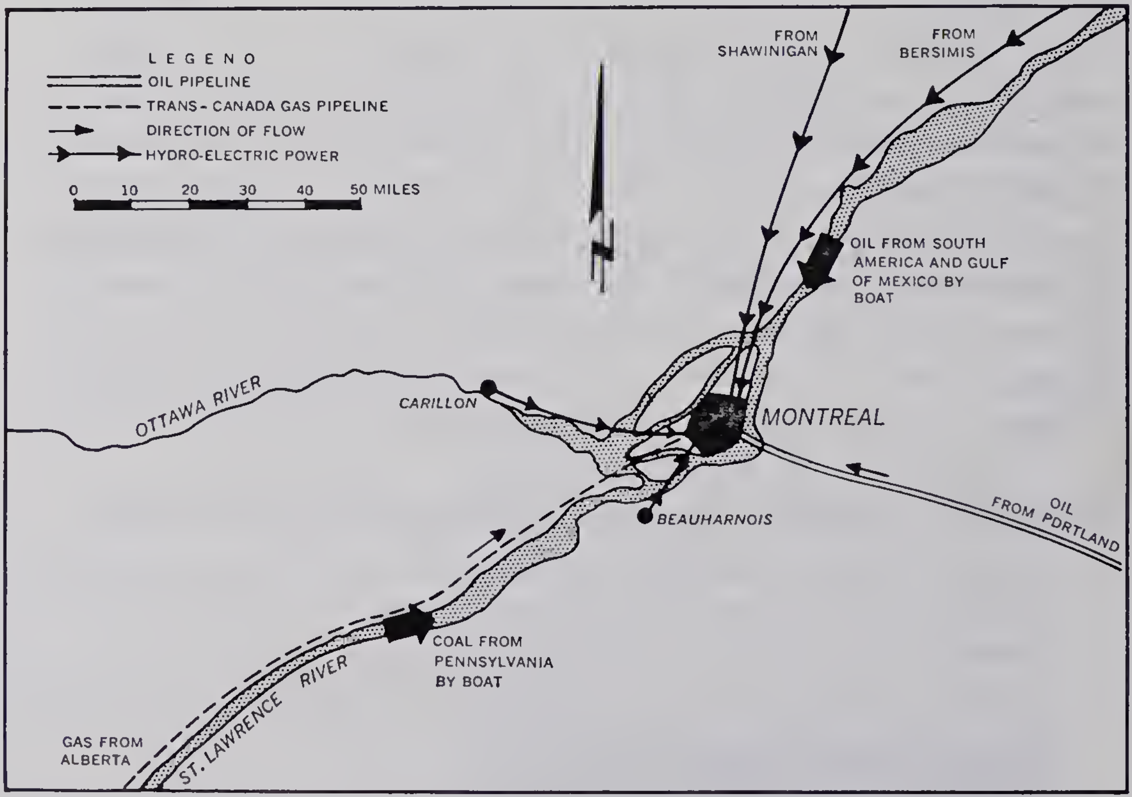
1. Refer to Figure 2—6 and to our study of the St. Lawrence Seaway on pages 20-26. What is the drop in elevation between Iroquois and Beauharnois locks?
2. (a) In Figure 4—21, what is the drop in elevation between Lake St. Francis and Lake St. Louis? Locate the Beauharnois powerhouse where this drop is converted into electricity.
(b) Estimate the length of the Beauharnois Power and Navigation Canal that lies to the south of the St. Lawrence River. This project, part of the navigation



4—21 The Beauharnois Project

system of the Seaway, was started in 1928 in connection with the power development. Estimate the length of the powerhouse. Some of the power produced here is sold to the United States and some to eastern Ontario. Most of it is used in Montreal.

(c) Locate the towns of Beauharnois and Valleyfield. The former is a centre for the production of aluminum, chemicals, and iron and steel. Textiles are manufactured at Valleyfield. Why are these towns well situated for industrial development?



4—22 The sources of energy used in Montreal

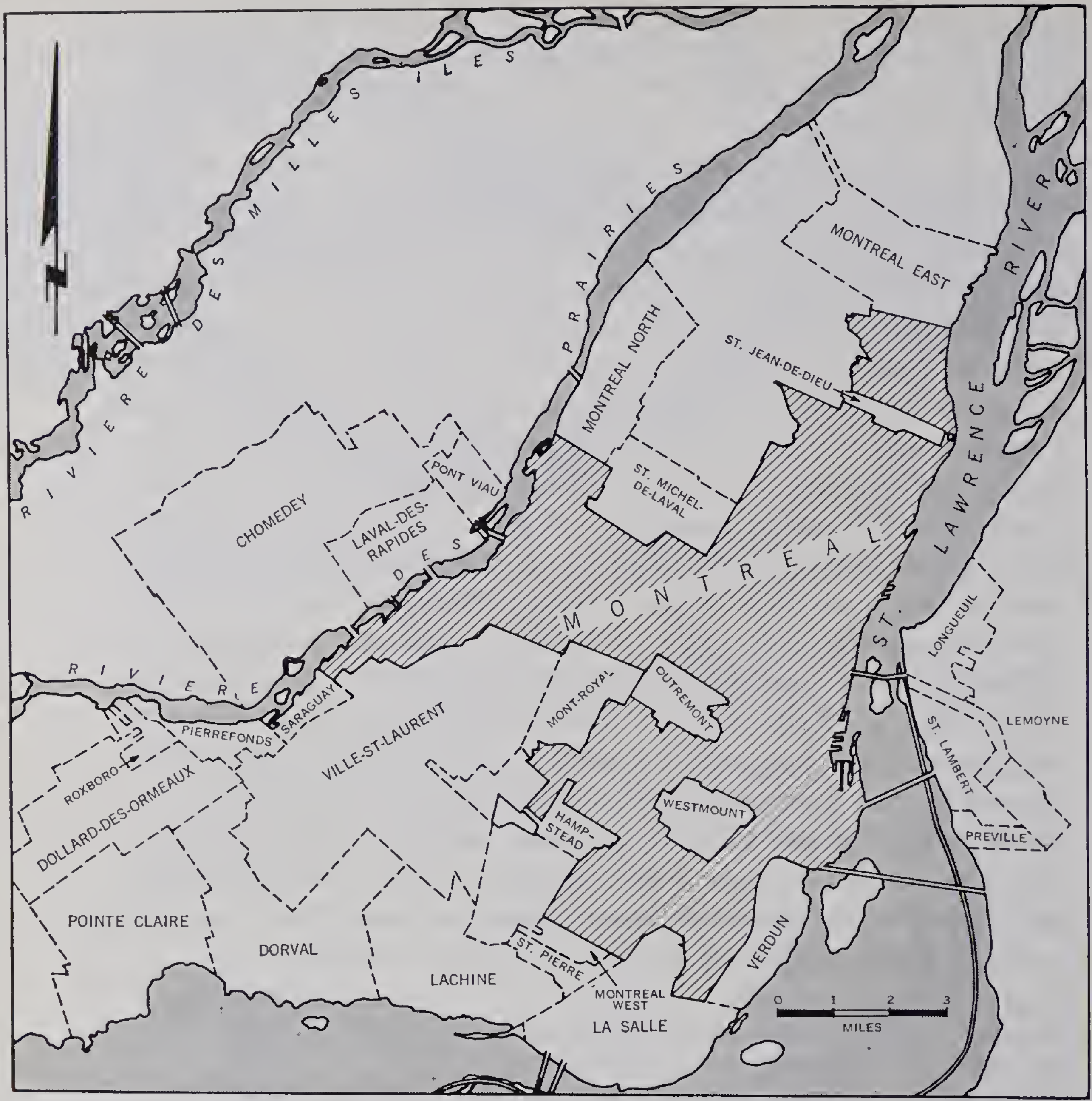
3. Figure 4—22 is a map that shows all the forms of energy that flow into Montreal and help to make it Canada's greatest manufacturing city. Name the four sources of energy concerned. From what areas does Montreal obtain each kind of energy?

In 1961, Greater Montreal became the first metropolitan area in Canada to reach a population of more than 2,000,000 persons. About 70 percent of this number live in the city of Montreal. The rest live in nearly 40 towns and cities in the surrounding area. Some of these, such as Verdun, a residential suburb of 80,000, are larger than the capital cities of several provinces. Montreal East, Lachine, and St. Laurent are all major industrial centres, ranking among the first 10 or 15 in all Canada in this respect. Greater Montreal is Canada's leading centre for the manufacture of clothing and railway rolling stock. Boots and shoes, electrical goods, chemicals, aircraft, iron and steel products, and a great variety of food products are industries that give employment to thousands. The various municipalities that make up Greater Montreal are shown in Figure 4-23. Settlement now covers most of the island of Montreal and is spilling over into other islands and onto the nearby mainland. We have already noticed how "urban sprawl" has spread into Chateauguay County, into rural areas such as that farmed by Mr. Brault and his neighbors. Beyond the official census boundaries of Greater Montreal are many important towns and cities. Valleyfield and Beauharnois are examples of these. All these cities are located on the Montreal Plain. Among the towns that should be mentioned (locate these in Figure 4-13) are the following:

Town	**Products**	**Population**
Joliette	textiles and tobacco products	18,088
St. Therèse	chemicals, food products	11,771
St. Jerome	paper, clothing, rubber goods	24,546
Sorel	textiles, shipbuilding, smelting of titanium	17,147
Contrecoeur	smelting of Labrador iron ore	2,007
St. Hyacinthe	textiles, processing of sugar beets	22,354
St. Jean	textiles	26,988

The importance of textiles will be noted in the above towns, as in Greater Montreal itself. However, this industry has been declining for some years, due to the competition from American, British, and Japanese textiles.

Considerably more than one tenth of the Canadian people live in Greater Montreal and in the neighboring Montreal Plain. In addition to being the centre of Quebec's greatest agricultural, commercial, and industrial area, Montreal has many other functions. As the home of more than 1,000,000 French Canadians, it is the second largest French-speaking city in the world.



4—23 the chief municipalities of Greater Montreal

If you visited Montreal and drove through the streets, you would see signs like these:

Arrêtez Stop	Ralentir Slow Down	Pont Bridge

Most signs and notices like these are displayed in both languages. Most Montreal newspapers are printed in French. Radio and television broadcasts may be heard in both languages. Schools are organized on the basis of language and religion. If you lived in Montreal and attended an English-speaking school, however, you would begin to learn French in Grade 3.

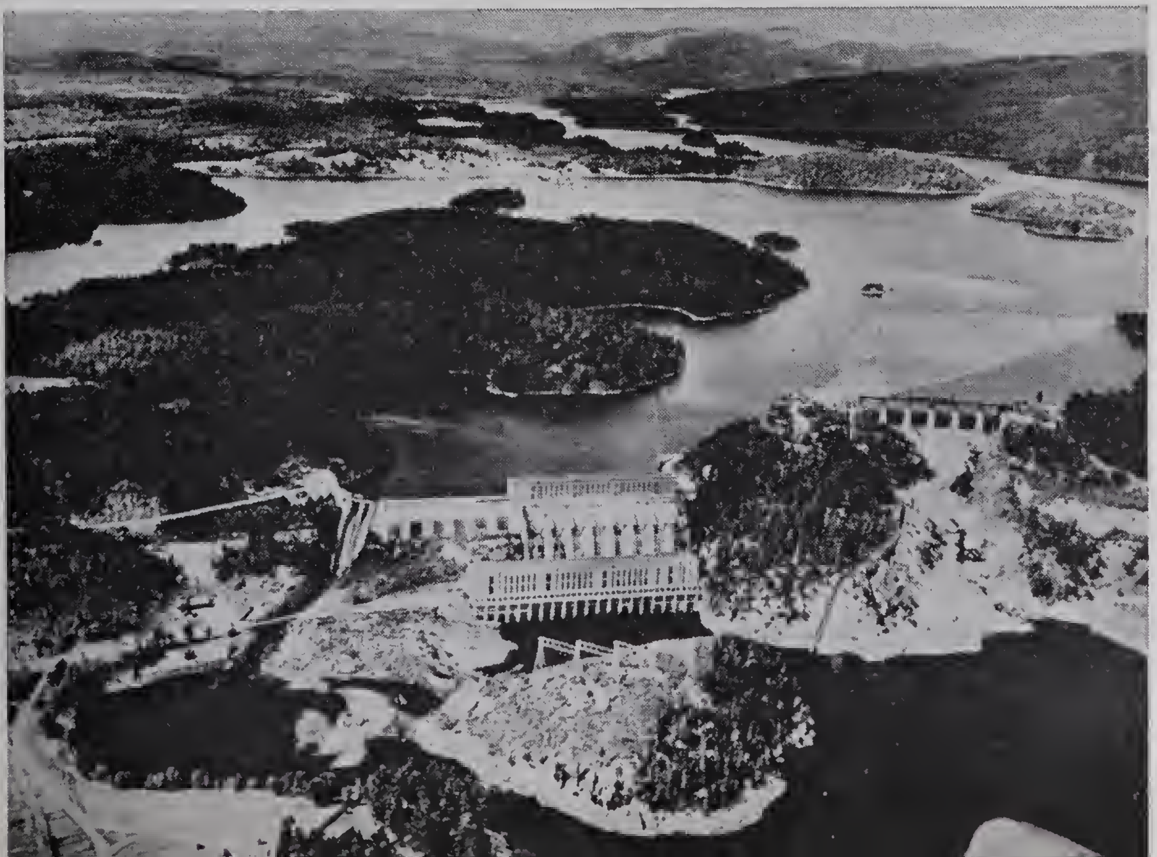
In addition to the French and English-speaking population, there are thousands of people of other races and nationalities. In fact, most of the world's races, languages, and religions are probably represented in the city. With its many restaurants, theatres, art galleries, and museums, Montreal is an entertainment and cultural centre of note. As "the city of churches," it is one of North America's leading religious centres. Several universities and two large school systems make Greater Montreal one of Canada's leading educational centres.

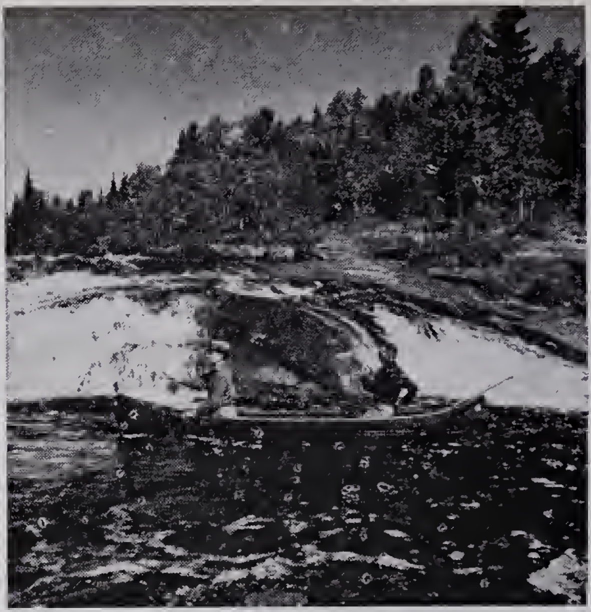
Few cities in the world are growing as fast as Montreal. As Figure 4-19 shows, it is becoming a city of skyscrapers. The five largest office buildings in Canada are located there. The immense numbers of people thronging into the city every day have created a serious traffic problem, to meet which Montreal is now building a subway system.

The Laurentians — Montreal's Playground

Refer to Figure 2-67 on page 101. Where does the Canadian Shield lie in relation to Montreal? This section of the Shield is called the Laurentian Mountains. The western part of these ranges is closely tied to Montreal. Properly speaking, they extend from the Saguenay Valley on the east to the Ottawa Valley on the west. They are drained mainly by the St. Maurice and the Ottawa rivers. Locate the region in Figure 4-2. The photograph of Quebec in Figure 4-34 will give you a good idea of the appearance of the skyline of most of the Laurentians. Describe this skyline. Figure 4-24 is a view of part of the Western Laurentians.

4—24 Power development in the Western Laurentians on the Gatineau River near Hull (Gatineau Power Co. Ltd. photo)





4—25 Sport fishing on the southern edge of the Laurentians near Montreal. How can you tell from the trees that this is the southern and not the northern part of the Canadian Shield? (Quebec Government photo)

How do the Laurentians differ from the nearby Montreal Plain?

1. Describe the major natural and cultural features of this landscape.
2. Give reasons to explain why this is a good "playground" and recreation area. Figure 4—25 shows two men engaged in sport fishing in the Laurentians near Montreal. Notice the mixed forest, characteristic of this part of the Laurentians. Why do we call this a mixed forest?
3. Explain fully, from evidence in the pictures, other uses, besides tourism and recreation, that man makes of this landscape.
4. Study Figure 2—60 again, in Chapter 2. The Ottawa Valley, shown on this map, is part of the St. Lawrence Lowlands. The area to the north of the river belongs to the Laurentians. List some features of the landscape indicated on map and identified in the photographs. Compare the Canadian Shield area with the Lowland.
   (a) What evidence is there that the Shield area is more rugged and of higher elevation than the Lowland area? What is the highest elevation indicated on the map?
   (b) Which area has the greater forest cover? Explain why.
   (c) Which area is more densely settled? Explain why. Compare the settlement patterns in the two areas of the map.
   (d) Compare the road patterns in the two areas. Account for the differences.
   (e) What evidence is there that more French-speaking people live north of the Ottawa River than south of it?
   (f) Make a list of natural resources of the Laurentians from information given on the map.
5. List the outstanding features of the Canadian Shield in Quebec, judging from the photographs and map.

In addition to the great power development shown in Figure 4-24, the Ottawa River had been harnessed in the area near Lachute, about 45 miles west of Montreal. When fully developed, this will be one of the major producers of electricity in the Quebec hydro-electric system. Mining is of some importance in this region. Building materials, industrial minerals such as mica and graphite (from which the "lead" of your pencil is made), and small quantities of some metals such as lead, zinc, and iron are extracted.

As our picture studies indicated, the forest resources of the Laurentians are important. At St. Andrew's East, near Lachute, the first paper mill in Canada was opened in 1804. From this small beginning has developed the great pulp and paper industry in which Canada leads the world. About half of the newsprint made in the world is made in Canada. Quebec accounts for more than half of this share. The industry is by far the most important form of manufacturing in the province.* Immense quantities of wood are required and this puts a severe strain on the province's forests. This is especially true in the Laurentians, where the forests have probably been used for pulp and paper longer than any other. Great mills at Hull, St. Jerome, in Montreal itself, and at Hawkesbury in Ontario draw their raw materials from the Laurentian forests. Nowhere in Canada is good forest management more important. This is being promoted by a system of "tree farms" in which the government and large companies (such as the Canadian International Paper Company at Hawkesbury) encourage farmers to develop their wood lots as scientifically as possible. There are 483 tree farms in Canada, of which 226 are in Quebec; of this number, 70 are in Argenteuil County alone, in the heart of the Laurentian Mountains. The following account will give you some idea of how land in this county has been used (or misused) in the past and how, by treating trees as a crop, farmers have, in recent years, been able to increase their income and improve their land.**

> "In Argenteuil County, there are too few resources per farm. Too many of the farms are too small. There are many areas of light, sandy soils that will grow only thin pastures or poor crops—and yet they are being used for such purposes. Other farms are located on stony soils. In some areas, rocky, hilly soils have been cultivated. As a result, a good deal of erosion has occurred, as shown in Figure 4—26. Here the unwise cultivation of thin soils has exposed the underlying rocks.
>
> "Originally, the valley and sandy shores of the Ottawa River were covered with fine stands of white pine. Up the slopes were mixed stands of hemlock, spruce, and hardwoods. The first settlers, who arrived here in the 1790s, were not farmers. They manufactured and sold **potash**. They cleared and burned the land, sowing crops between the stumps. When the land was worn out (and this took only a few years), they moved on to other timbered areas. In some

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*Most of the output is exported to the United States. The dependence of the province on this market was well illustrated late in 1962 and early in 1963. A newspaper strike in New York threatened 20,000 Quebec workers with unemployment.

**This account has been provided through the courtesy of Mr. Vernon Johnson, President, Canadian International Paper Company, who also supplied the accompanying photographs.

4—26 Erosion is a serious problem on this farm near Lachute (Canadian International Paper Co. photo)

places apples became an important crop. Today, there is some dairying, with about half the milk being sold in Montreal.

"However, since the beginning of settlement here, the forests have been important. A sawmill was built at Hawkesbury in 1805. Today, the pulp mill at that town is one of the largest in Canada. Meanwhile, farming has declined, although farms are larger than they used to be. This is how the land is used on a typical farm in Argenteuil today:

Crops	53 acres
Pasture	26 acres
Other improved land	4 acres
Woodland	84 acres
Unimproved land	27 acres
Total	194 acres

"Argenteuil County has a greater percentage of farmland in woods and a smaller percentage in crops than the average county in Quebec. Wood is becoming an important crop, as farmers learn to look after their lots. The Canadian International Paper Company has a nursery in the county where one million seedlings are grown every year to be sold at cost to farmers. Celestin Lauzon, a farmer near Lachute, has won an award for his tree farm. He has a 30-acre tree farm on a wet corner of his property. This land would raise poor crops, but Mr. Lauzon has worked hard to clean it up and improve it for the sake of future tree growth. He has been cutting out poorly formed trees in order to give the well formed trees a better chance to grow. Mr. Lauzon's woodlot has been earning him an average of $650 income per year since 1943. Because he has looked after it carefully, his lot is more valuable than it was 20 years ago. In Figure 4—27, we see an area near Lachute that

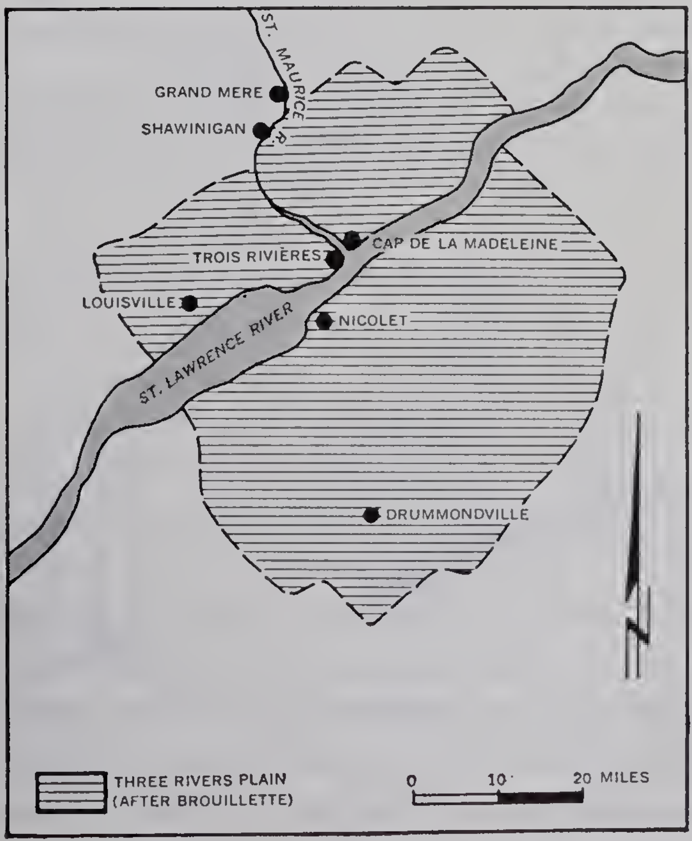
4—27 Tree plantings have done much to restore the value of this eroded land. A new road is being built here. (Canadian International Paper Co. photo)

30 years ago was covered with blown sand. The trees that have been planted since then have made this land valuable. The cutting is a right-of-way for a new road."

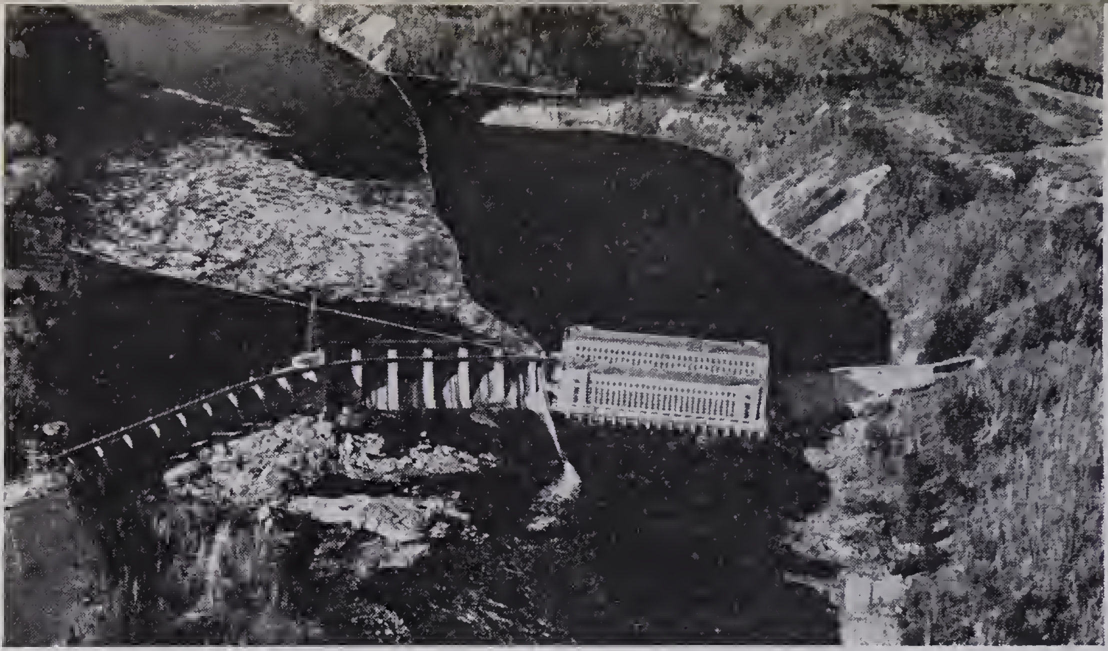
Three Rivers and "La Mauricie"

The Three Rivers Plain is simply a northeastern extension of the lowland plains around Montreal. (Three Rivers is the name used by most English-speaking Canadians, but many of us are also familiar with its French name, "Trois Rivières." We know several cities by two names, one English and one French.) The land south and west of Three Rivers is as flat as any to be seen in Canada. Like the Montreal Plain, it was once occupied by the Champlain Sea. Its soils thus consist of fertile marine sediments, although many areas are too boggy and swampy for cultivation. Hay is the chief crop and dairying is important everywhere. On the sandy soils north of Three Rivers, cigarette tobacco is grown.

Most of the Three Rivers Plain is densely populated. About half the population lives in towns and cities. Locate the following centres in Figure 4-28: Three Rivers, Cap de la Madeleine, Drummondville, Nicolet, Louisville. Three Rivers, located where the St. Maurice joins the St. Lawrence, is one of Canada's oldest cities. It was founded by Champlain in 1634. The St. Maurice Valley, above the city, is part of the Canadian Shield. However, Three Rivers cannot be separated from its hinterland.



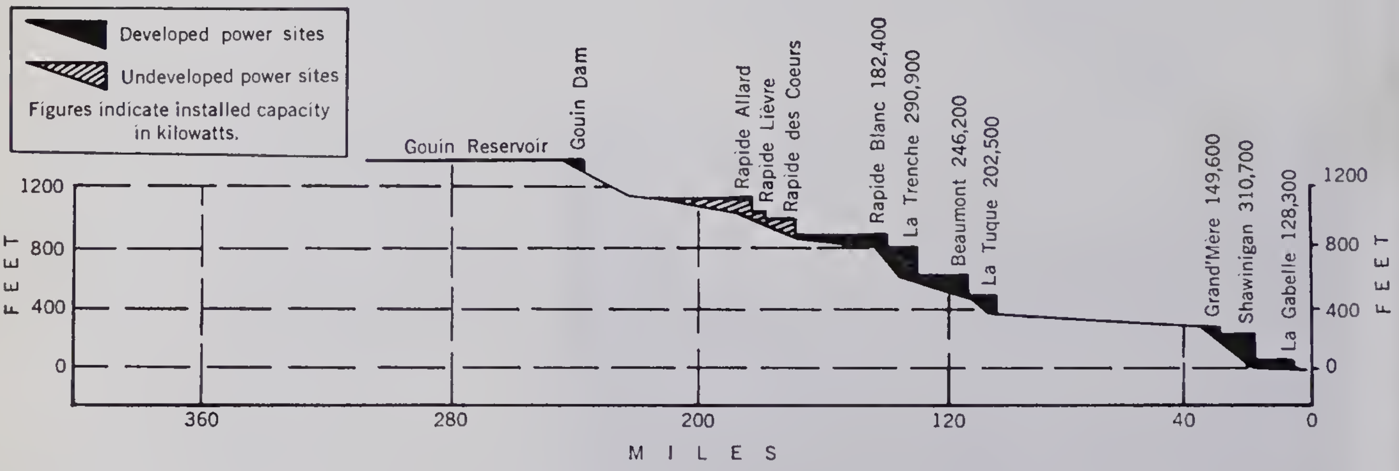
4—28 The location of Three Rivers (Trois Rivières) and its hinterland



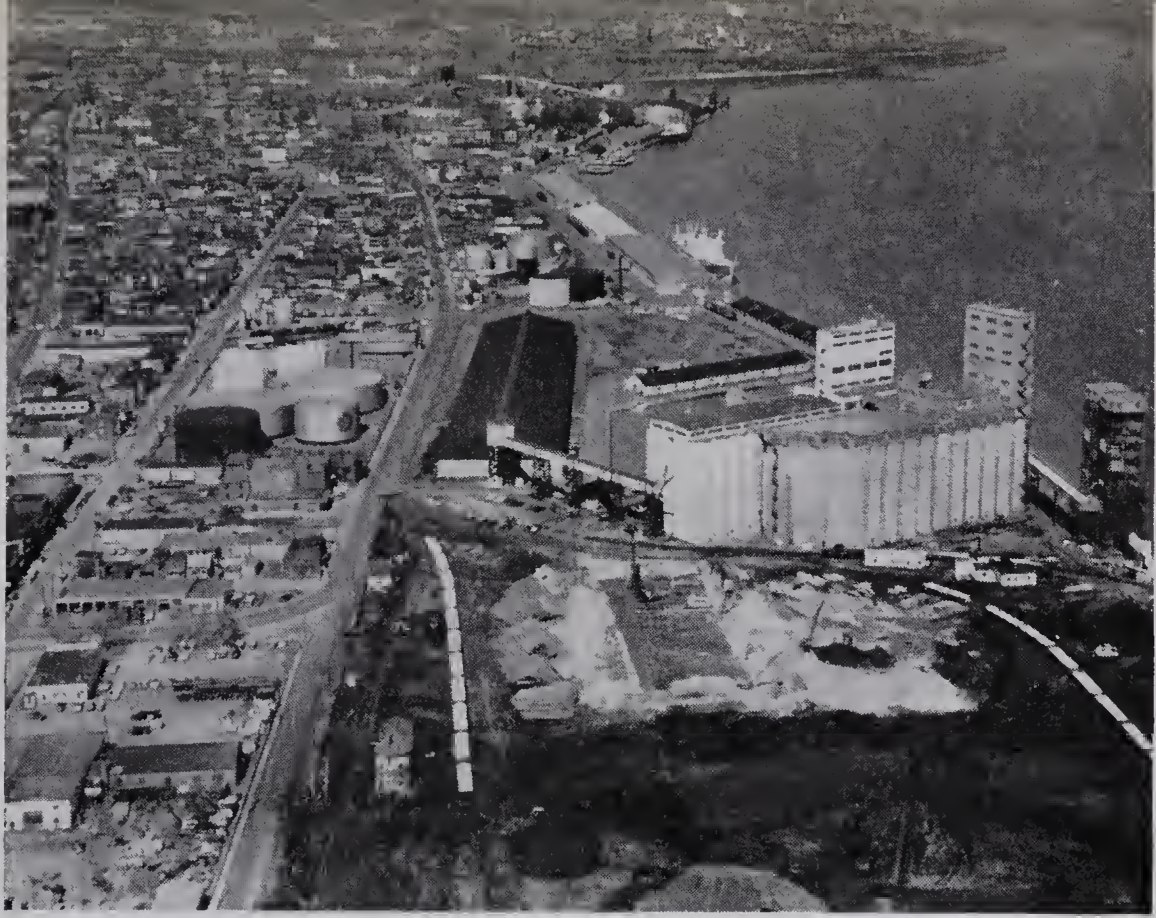
4—29 La Gabelle power development on the St. Maurice River. Refer to Figure 4—30 to find the location of this project (Photographic Surveys, Quebec, Ltd.)

How has the St. Maurice River contributed to the growth of Three Rivers?

1. Study Figure 4—29. This shows the major power development on the St. Maurice nearest to Three Rivers.
(a) What evidence does this picture give of the nature of the St. Maurice River?
(b) Note the great log boom in the photograph. How are the logs prevented from interfering with the dam and powerhouse? How are they conveyed past these structures to Three Rivers?
2. Study the profile of the St. Maurice River in Figure 4—30.
(a) What is the approximate total length of the St. Maurice River?
(b) How many feet does it drop between its source and its mouth at Three Rivers?
(c) How is water stored in the upper basin of the river?
(d) How many developed power sites are there on the St. Maurice? Where is the largest of these? How many undeveloped power sites are there?
(e) Refer to a good atlas map and locate all the places named in the profile.
3. (a) Now study Figure 4—31. What evidence of important industries can be found in this photograph?



4—30 Profile of the St. Maurice River showing power sites (after the **Atlas of Canada**)

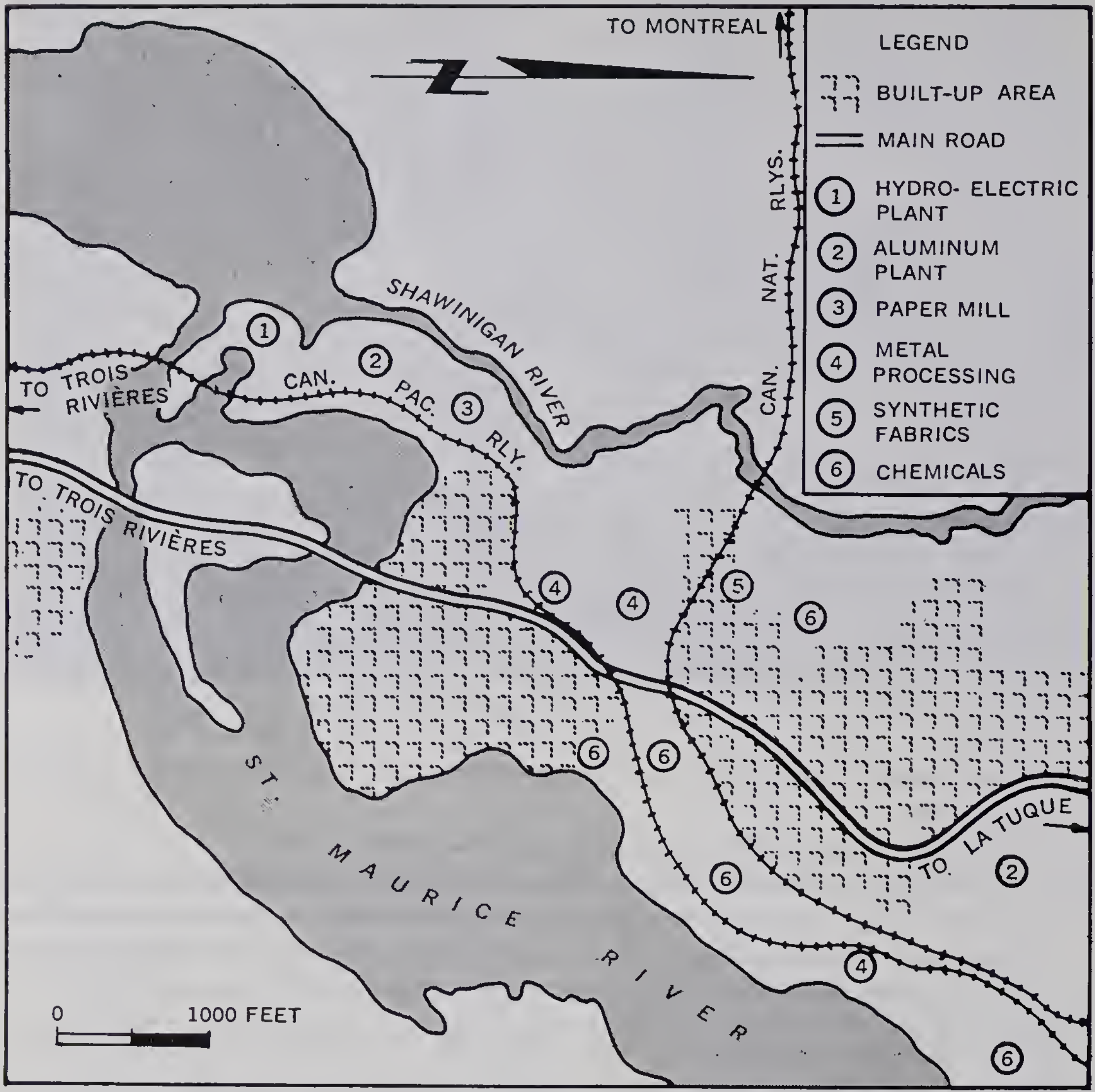


4—31 An aerial view of Three Rivers (**Le Nouvelliste,** Trois Rivières, photo)

(b) Where is the St. Maurice River in this picture? Name the body of water to the right.
(c) Name some imports and exports of Three Rivers.
(d) The chief imports besides those suggested by the photograph include cotton, bauxite, and sulphur. Name some important industries of Three Rivers and its hinterland that are based on these raw materials. Figure 4—31 gives little evidence of the chief industry of Three Rivers—the pulp and paper industry.

Three Rivers has been called the pulp and paper capital of the world. It has four large mills and, in addition, handles the raw materials and products of the entire St. Maurice Valley. Newsprint is the chief export. In total tonnage of cargo handled, Three Rivers often ranks as Canada's fifth or sixth greatest port. Overflows of grain from Montreal Harbor are handled and trans-shipped there.

The harnessing of the St. Maurice River was a great challenge to engineers. As Figure 4-30 shows, the rewards were great, for there are ten major points at which the descending waters can be used. There are also many smaller power sites at other points. A serious problem has been the variation of flow during the year. At Shawinigan Falls, the flow is 175,000 cubic feet per second during the spring. During the driest part of the summer, the flow may drop to 6000 cubic feet per second. By building reservoirs, engineers have been able to maintain a constant flow of 20,000 cubic feet per second. Gouin Reservoir was built for this reason. It is one of 30 reservoirs maintained throughout Quebec by the provincial government. By regulating stream flow in this way, the valuable water-power wealth is conserved and used to best advantage.



4—32 Large-scale map of Shawinigan Falls

The nerve centre of the vast St. Maurice power development is at Shawinigan Falls. Here, in 1900, began the task of harnessing the turbulent river. At that time, engineers were unable to transmit power more than 100 miles. Since then, they have learned to transmit St. Maurice Valley electricity long distances, to nearly all sections of southern Quebec. This supplies the needs of 50,000 Quebec farms, and more than 700 villages and towns. Its major use is in Quebec's large industries, such as pulp and paper, textiles, smelters, shipyards, chemical plants, and so on.

The town of Shawinigan Falls itself well illustrates the influence of the roaring waters of the St. Maurice River, and the many industries which these waters have made possible. Figure 4-32 is a large-scale map of this town. It had a population of 32,169, according to the 1961 census.

Shawinigan Falls and other towns of the St. Maurice Valley

1. (a) Name the tributary of the St. Maurice River that meets the main stream at Shawinigan Falls. From which direction does this tributary flow?
(b) Describe the location of the Shawinigan Water and Power Company. Refer to Figure 4—30 again and compare the size of this development with others on the St. Maurice River.
(c) What is the average width of the St. Maurice River in the general area of Shawinigan Falls?
(d) Make a list of all the industries of Shawinigan Falls that appear on this map. What raw materials are used in these industries? Where would these raw materials come from? How would they reach Shawinigan Falls?
(e) Why must road and rail, instead of water transport be used to send manufactured goods from Shawinigan Falls? Which city serves as the port for this industrial centre?
2. Locate Grand'Mère and La Tuque on an atlas map. These St. Maurice Valley towns produce pulp and paper. Textiles are important at Grand'Mère. La Tuque has many sawmills.
3. Return now to the original problem stated on page 166 and explain how the St. Maurice River has helped to make Three Rivers a major port and city of Quebec Province.

Quebec — the Ancient Capital

It was in 1608 that Samuel de Champlain chose Quebec as the site of the first permanent settlement of New France. It has been the centre of French-Canadian life and culture ever since. As the capital of Quebec, a major industrial centre, and one of Canada's largest cities and chief ports, it remains important today.

Jacques Cartier was the first white man to visit the present site of Quebec. He describes how he went up the St. Lawrence, coasting by an island "at the end of which we came to a forking of the waters, which is an exceedingly pleasant spot where there is a small river and harbor. . . . We thought this river a suitable place in which to lay up our ships in safety." In 1749, Peter Kalm, a Swedish visitor to Canada, described a journey from Montreal to Quebec as follows:*

> "The shores of the river grow more sloping as you come nearer to Quebec. To the northward appears a high ridge of mountains. About two French miles and a half from Quebec, the river becomes very narrow, the shores being within the reach of a musketshot from each other. The country on both sides was sloping, hilly, covered with trees, and had many small rocks. . . .
>
> "Quebec, the chief city of Canada, lies on the western shore of the St. Lawrence River, close to the water's edge, on a neck of land bounded by that river on the east side, and by the St. Charles River on the north. . . . The city is divided into the upper and lower section. . . . The upper city lies above the other on a high hill, and takes up five or six times the space of the lower,

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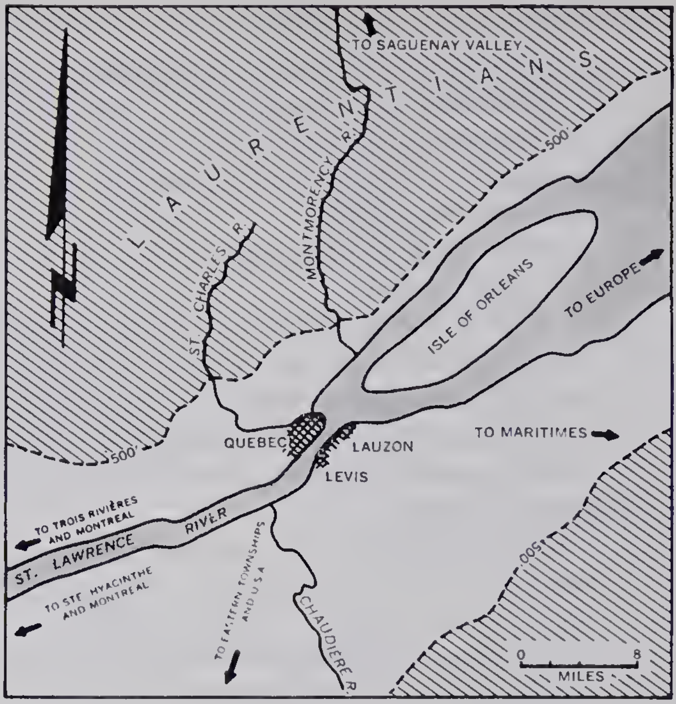
*Quoted from "Travels Into North America," edited by A. B. Benson and reproduced from Reid, McNaught, and Crowe, *A Source-Book of Canadian History,* by kind permission of Longmans, Green and Company, Toronto.



4—33 The Quebec Plain

though it is not quite so populous. . . . Most of the merchants live in the lower city, where the houses are built very close together. The streets in it are very narrow. . . ."

How did the site of Quebec appear to two visitors in earlier times?

1. (a) To what island does Cartier refer?
(b) In which river did he anchor his vessels? Which letter on the photograph in Figure 4—34 identifies this river?
2. In the photograph, find "the high ridge of mountains" that Peter Kalm saw. Which major physical region of Canada is represented by these mountains? The map in Figure 4—33 will answer this question.
3. Both Cartier and Peter Kalm agree that the St. Lawrence narrows at Quebec. Measure the width of the river there, on the map in Figure 4—33. Quebec is an Indian name that means "where the river gets narrow." Compare the width at Quebec with the width of the St. Lawrence on the downstream side of the Isle of Orleans. Below this island, the river widens still more to an average breadth of 30 miles. This broad **estuary*** or gigantic **drowned valley** extends nearly 600 miles to the open sea. At Quebec a tidal effect is felt.
4. Which letters identify the Upper Town and the Lower Town in the photograph? In the foreground, note the great fortifications of the Citadel. State reasons why Quebec was an easy place to defend in the early days. Refer to a textbook on Canadian history and read the exciting story of how General Wolfe and his troops managed to scale the Heights of Abraham in 1759. There, just west of the Citadel that appears in the photograph, the most important battle of Canadian history was fought.
5. What does this photograph tell about the exports, imports, and industries of Quebec.
6. If Peter Kalm visited Quebec now, what do you think are the most important changes that he would notice? How has the countryside near the city changed since his time?

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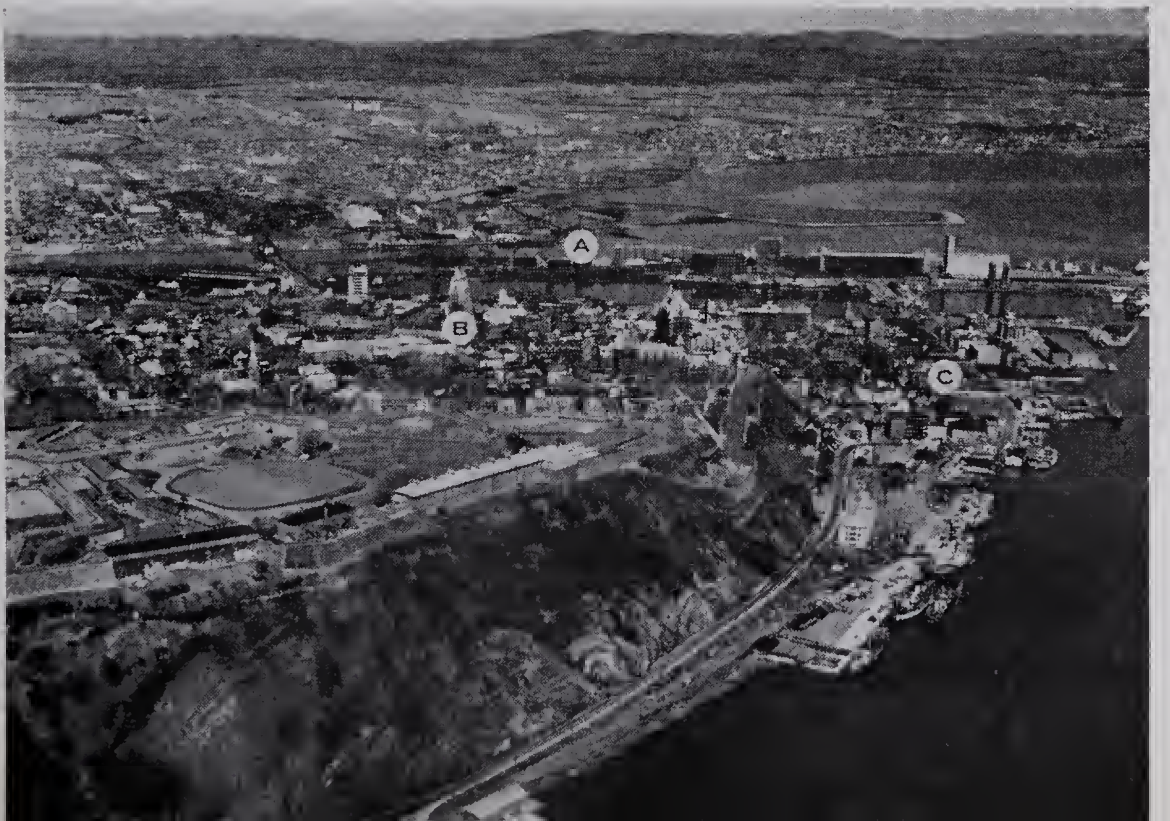
*An estuary is the mouth of a river where salt and fresh water mix and where a tidal effect is felt. The lower St. Lawrence Valley is "drowned" where the sea extended after the ice sheet had depressed the land.

The Quebec Plain is the section of the St. Lawrence Lowlands east and west of Quebec that consists of land of less than 500 feet in elevation. This area is shown in Figure 4-2. What is the approximate width of the plain at Quebec? Farming there is centred largely on the Isle of Orleans. This island was settled in 1641 and its long, narrow fields, old stone houses, and the fine churches of the little villages make it one of the most interesting places in Canada. The growing of fruit and vegetables, and dairy farming are the most important activities. Elsewhere in the Quebec Plain, hay and dairying account for most of the land use. Winters here are somewhat colder than at Montreal, but summers are nearly as warm. The growing season is about the same as at Mr. Brault's farm in Chateauguay County.

We have already noticed the presence of pulp and paper mills at Quebec. Shipbuilding and textiles are also important. The first shipyard in Canada was established on the St. Charles River in 1731. The making of shoes, clothing, and tobacco products, and the packing of meat are other industries that employ many people at Quebec. Other towns in the region have similar industries. Figure 4-35 shows the famous Montmorency Falls, northeast of Quebec. Compare the distant skyline with that of Figure 4-34. Here, waters dropping down to the St. Lawrence River from the Canadian Shield have been harnessed to produce electricity. The large building at the left manufactures cotton cloth. Why is it well located?

No Canadian city has so many "firsts" to its credit as Quebec. Here was the site of Canada's first permanent settlement, and the first

4—34 Aerial view of Quebec City (Hunting Survey Corporation Limited photo)



important agriculture, the first mission, church, school, college, port, and industrial centre. Quebec was also the site of one of Canada's first fur trading posts; by 1760, its population was 9000. Until 1850, it was a greater port than Montreal. At that time, it shared with Saint John, New Brunswick, the bulk of Canada's lumber trade. The coming of steam vessels and the dredging of Montreal Harbor enabled Montreal to surpass Quebec as a port. However, Quebec remains important as a handler of forest products, grain, and general cargoes. Its ocean terminals receive the largest passenger vessels that dock regularly at any Canadian port.

Quebec has been called the most beautiful and historic city in North America. As such, it has a valuable tourist trade. During the summer months especially, tourism is one of the most important sources of income to the people of the city. The famous Winter Carnival also attracts thousands of visitors.

The St. Lawrence Lowlands — a conclusion

Why is the small region of the St. Lawrence Lowlands one of the wealthiest and most densely populated parts of Canada? In answering this question think of the location and history of the region and of the natural resources available in or near it.

THE EASTERN TOWNSHIPS OF QUEBEC

Refer to an atlas map of Quebec and locate the city of Granby, east of Montreal. How many miles from Montreal is this "gateway to the Eastern Townships"? On the same map, locate these towns: Cowansville, Waterloo, Victoriaville, Drummondville, Magog, East Angus, Richmond, Coaticook, Thetford Mines, Asbestos. What do these names tell you about the nationality or origin of the people

4—35 Montmorency Falls and surrounding countryside near Quebec City (Quebec Publicity Bureau photo)

who first settled the Eastern Townships? The term "townships" itself suggests that the people who settled here were not French-speaking. The land was not divided into seigneuries but, rather, into townships of the type that the early settlers had been used to in New England. This system was very similar to the township system of Ontario that we studied on page 38. It was introduced by American settlers who colonized the Eastern Townships between 1790 and 1820.

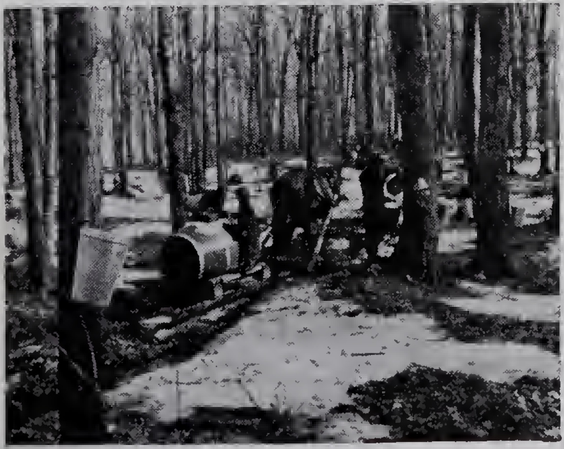
The Eastern Townships are no longer a major English-speaking area. The 1956 population figures show that in none of the towns listed above are English-speaking people any longer a majority of the population. In most of the 13 counties that make up the region, French-speaking people form at least 85 percent of the population. These counties contain about half a million people, or more than the total population of the province of Newfoundland. In this section, we shall try to answer two main questions:

1. What resources and industries support this large population?
2. What features — besides a large French-speaking population living in an area originally developed by English-speaking settlers — make the Eastern Townships a distinct region of Quebec?

Figures 4-36 and 4-37 show forests that are mainly *second growth,*[*] the original forest having been cut over several times for timber or pulpwood. Many forests have regenerated on abandoned farmland.

How are the forests of the Eastern Townships used?

1. Figure 4—36 shows a farmer and his family gathering sap from maple trees.
(a) Which season of the year is this? Give reasons for your answer.
(b) Are these trees hardwood (deciduous) or softwoods (coniferous)? Again give reasons for your answer.



4—36 Scene in a "sugar bush" in the Eastern Townships (Quebec Provincial Publicity Bureau photo)

4—37 Gathering wood in the Eastern Townships (Quebec Publicity Bureau photo)

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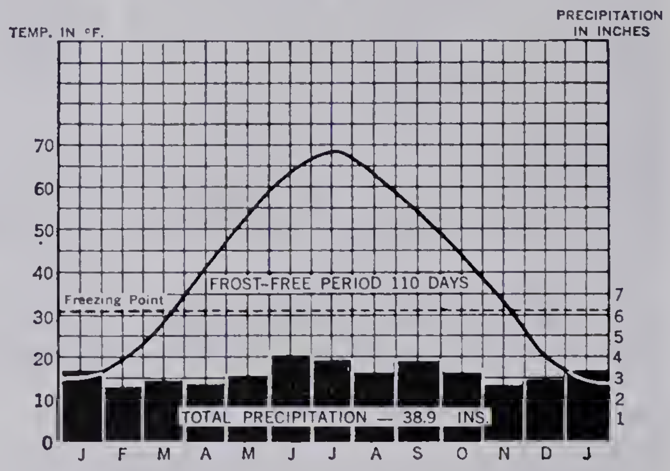
[*] Second growth refers to timber that has grown on land after the original forest has been removed.

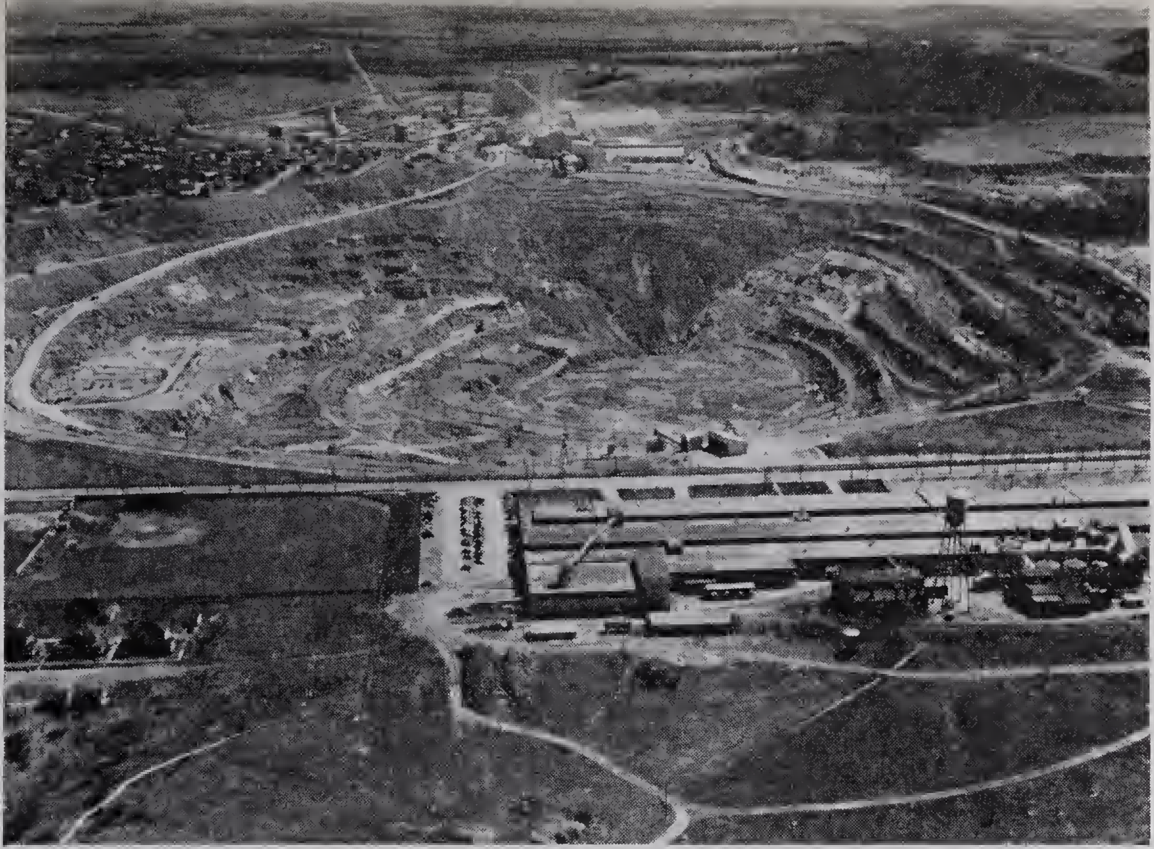
(c) Describe the method of tapping the trees. What are the two boys in the centre of the picture doing? After the sap has been collected it will be boiled and made into syrup or maple sugar. Quebec produces nearly half of North America's output of these products. The bulk of production comes from the Eastern Townships and the Chaudière Valley, which lies to the east. A **sugar bush**, such as you see in Figure 4—36, provides an important part of the farmer's income. Good quality maple syrup sells for as much as $2.00 per quart.
(d) The horse is still a useful animal on Quebec farms. Why would he be especially useful in a sugar bush?
2. Figure 4—37 again suggests the importance of the horse on Quebec farms. Study the forest in the background.
(a) What types of trees grow there?
(b) How is this lumber probably used?
(c) Why is travel on Quebec roads in the winter not too difficult, in spite of the harsh weather conditions?
3. The picture studies have suggested that cold, snowy winters are a feature of the Eastern Townships. Study the climatic graph of Sherbrooke, in Figure 4—38.
(a) How many months of the year have average temperatures below freezing? The frost-free season here is 110 days. What is the January average temperature according to the graph?
(b) Compare the conditions just noted (the January average and the frost-free season) with those at Montreal. Review Figure 4—20 for this purpose. Compare conditions at Sherbrooke with those for your neighborhood.
(c) Describe summer conditions at Sherbrooke. Again, compare with Montreal and your area.
(d) Do farmers at Sherbrooke get sufficient summer rainfall for their crops? Explain. Compare this situation with that in your home region.

Windsor Mills is the site of the largest pulp and paper plant in the Eastern Townships. This and other smaller plants in the region give evidence of the continuing importance of the region's forest resources.

Millet, a type of grain used for cattle feed, is an important crop in the "Townships." The production of feed, especially hay, is the chief form of agricultural land use in the Eastern Townships. The dairy farms of the region help Quebec to maintain its position as Canada's



4—38 Climatic graph of Sherbrooke, P.Q.



4—39 The Great Jeffrey Mine at Asbestos (Photographic Services, Quebec, Limited)

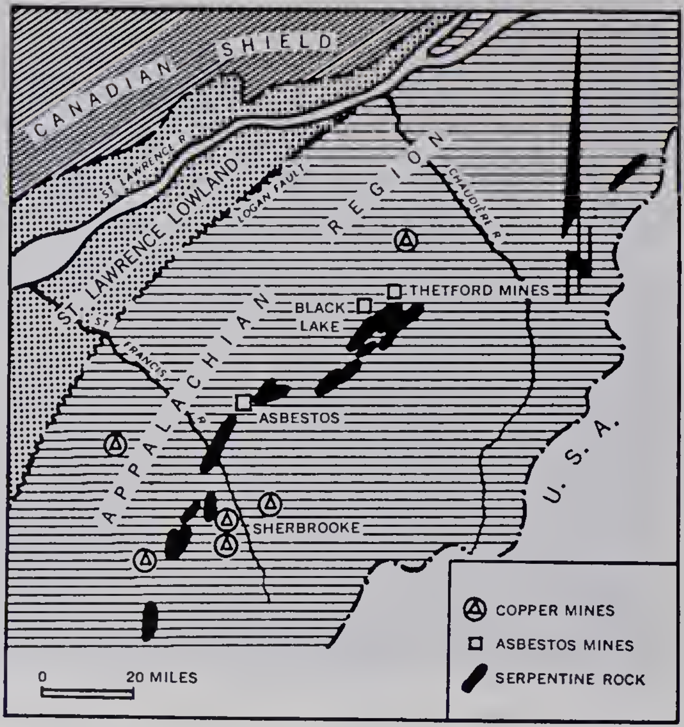
leading producer of butter and milk. Beef cattle, sheep, hogs, and poultry are also raised on many prosperous farms.

In 1876, at Thetford Mines, large deposits of asbestos, the most important mineral discovery in the history of the Eastern Townships, were found. Since then, the region has become the world's major producer of the fireproof fibre. Try to name some uses of asbestos, that you have noticed in your community. Figure 4-39 is a view of the great Jeffrey Mine at the town of Asbestos.

Asbestos — chief mineral wealth of the Eastern Townships

1. (a) Locate the town of Asbestos on an atlas map. Where does part of it appear in the photograph?
(b) Asbestos is mined by two methods. These include open-pit quarrying and shaft (underground) mining. Which type is being carried on in the centre of the photograph? In the background of the photograph is a mill where the greenish, serpentine rock is crushed and the asbestos fibres removed.
(c) In the foreground of the picture, a large brake-linings factory is visible. Suggest reasons why the plant is located there.
2. Figure 4—40 shows the location of the Serpentine Belt of the Eastern Townships. This is an underground seam of greenish, metamorphic rock already described.
(a) In which direction, starting from the south, does it extend across the Eastern Townships?
(b) Name another centre of asbestos production besides those already discussed.
(c) Name another important mineral produced in the region. To the south, near the Quebec border, building materials, especially granite, occur in large quantities.

4—40 Sketch map of the Serpentine Belt of the Eastern Townships and of its mineral deposits



The rugged areas of the Eastern Townships, with their many streams and lakes, and beautiful scenery, form the basis of a growing tourist industry. Quite cool summers attract many visitors from Montreal and nearby American cities. Many resorts are now open all the year around, as winter sports facilities have grown. Since 1950, the region has become a real rival of the Laurentians as a winter playground. In and around such villages as North Hatley, the tourist industry now far exceeds farming as a source of income.

To the east of the Townships lies the Chaudière Valley which, for our purposes, is included in the region. This area was settled in very early times by the French. Trace the course of the Chaudière River on an atlas map. In which direction does it flow to meet the St. Lawrence? Where does it join the St. Lawrence? The valley is the main centre of the Quebec maple syrup industry, already discussed.

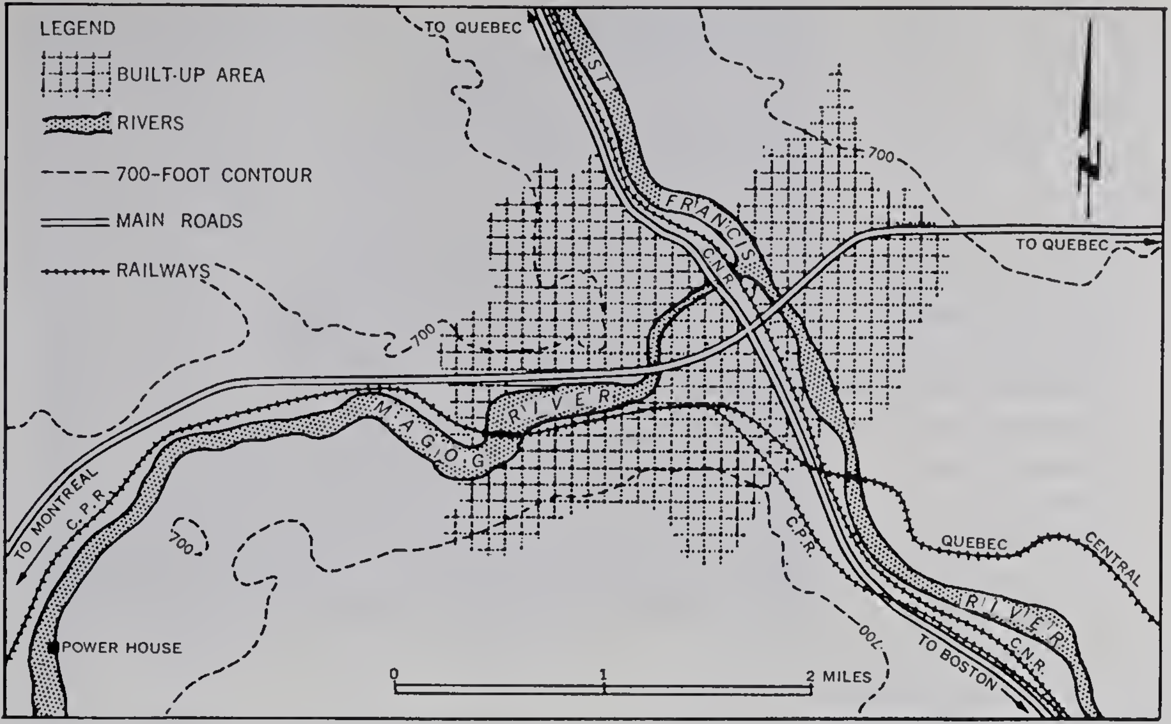
The first settlers in the Eastern Townships proper were English-speaking. By 1830, there were about 40,000 people in the region, nearly half of them Americans. The development and growth to present times of the chief towns is well illustrated by the story of Sherbrooke.

Why is Sherbrooke the major centre of industry and population in the Eastern Townships?

Figure 4—41 is a large-scale map of Sherbrooke. The city was founded in 1794 by Gilbert Hyatt, a United Empire Loyalist settler from Vermont.

1. (a) Trace the course of the St. Francis River on an atlas map. In which direction does it flow to meet the St. Lawrence?

(b) From the large-scale map, name the river that meets the St. Francis at Sherbrooke.



4—41 Large-scale map of Sherbrooke

(c) What is the highest contour shown in the vicinity of Sherbrooke? The city has grown up on the terraces of the two rivers, the banks of which are about 500 feet above sea level. On which bank (east or west) of the St. Francis has the main part of Sherbrooke developed?
(d) Describe the source of Sherbrooke's electricity, according to the map.
2. (a) By studying the road and rail pattern, explain why Sherbrooke is described as a major junction of routes.
(b) On an atlas map, note Sherbrooke's location in relation to some major cities of Canada and the United States.
(c) Suggest why Sherbrooke has been called the hub of the Eastern Townships.
3. Review Figure 4—38 and the questions on pages 173 and 174. Note the outstanding features of the climate of Sherbrooke.

The above exercise shows how Sherbrooke, as did most centres in the Eastern Townships, grew up beside a water-power site. Here, power was available for various kinds of mills: sawmills, flour mills, textile mills, etc. At first, the direct power of the moving water was used. Later, as hydro-electric power developed, power plants, such as that shown on the map, were built. Towns also developed at the junction of rivers and their tributaries, as in the case of Sherbrooke. For many years, the Eastern Townships were isolated from Montreal, due to the lack of roads and railways. However, Sherbrooke is now a major junction of routes and is served by no less than three railways. Construction of these began during the 1850s, by which time Sherbrooke was already a city of 12,000 people. Today, it has more than 60,000 people. If neighboring towns are included, Greater Sherbrooke contains 75,000. Within the boundaries of the city proper, nearly 20,000 people are employed in factories, offices, public services, and other enterprises. The following figures will give you a good idea of the range of manufacturing industries in Sherbrooke:

Type of Manufacturing	No. of Employees	No. of Establishments
Food and beverages	458	14
Rubber products	442	3
Leather products	257	3
Textile products (except clothing)	2829	8
Clothing (textiles and furs)	1841	11
Wood products	327	11
Paper products	241	2
Printing and publishing	699	13
Iron and steel products	2491	21
Transportation equipment	433	2
Non-ferrous metal products	126	5
Non-metallic mineral products	243	2
Chemicals and drugs	129	3

4—42 Manufacturing industries in Sherbrooke, 1959

Many of the industries in the above list are also found at other centres in the Eastern Townships. The main centres are listed on page 172. At Granby, for example, textiles, rubber goods, and tobacco products are made. Magog has one of Quebec's largest textile mills. Cowansville also produces textiles and in addition makes furniture. Various centres have paper mills. The largest of these is at Windsor Mills.

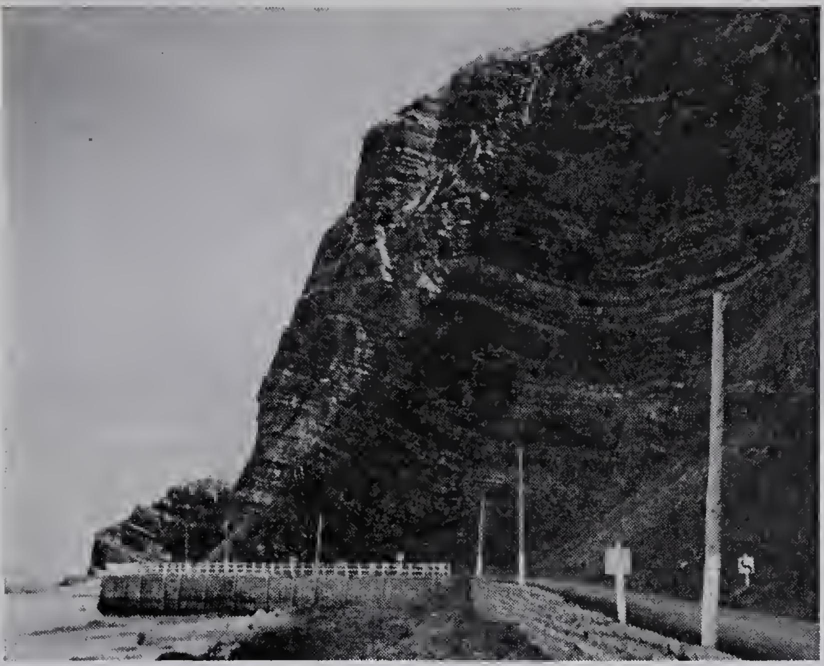
The Eastern Townships — a conclusion

Refer again to the two questions on page 173. In discussing the second question, think how the Eastern Townships are different from the St. Lawrence Lowlands. They are similar to the Laurentians in some ways. Explain this. In what ways are they different from the Laurentians?

THE ST. LAWRENCE SOUTH SHORE AND GASPÉ

This region of Quebec extends northeastward from the Eastern Townships. Its scenery and occupations remind the visitor of the Atlantic Provinces (see Chapter 5). Most of the region is often grouped with these provinces as part of what is called Appalachian Canada.

Much of the south shore area is really a rather isolated part of the St. Lawrence Lowlands. Here, the lowland is quite narrow and fairly densely settled. Some of Quebec's oldest towns are located here. Farming is based on hay and dairying. Centres such as Rimouski, Rivière du Loup, and Mont Joli process forest products from the interior. All are transportation junctions of some importance.



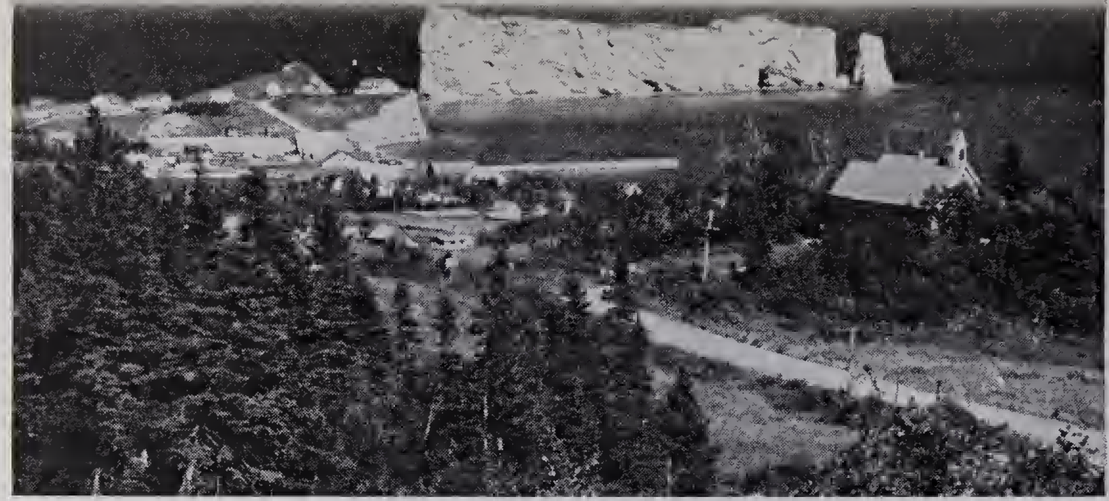
4—43 A scene on the north shore of the Gaspé Peninsula (Quebec Publicity Bureau photo)

The pattern of settlement is made up of farms and villages strung out along the shore, with narrow fields extending back at right angles from the river. In other words, it is very similar to what we studied in Figure 4-5 and in the questions on pages 137 and 138. The old French-Canadian way of rural life is more easily seen here than near cities such as Montreal and Quebec.

In 1534, Jacques Cartier planted the French flag near the present town of Gaspé. There, he claimed all of Canada for the King of France. Since then, this region has grown to have its present population of more than 100,000 people. However, like the Maritime Provinces, it has grown slowly and its people are poorer than those who live in the populated areas of southwestern Quebec. Let us see if we can find the reason.

Some chief features of landscape and life in the Gaspé Region

1. Figure 4—43 provides a view of the north shore of the Gaspé Peninsula.
(a) Name the body of water visible in this picture.
(b) Describe the nature of the coast, as revealed by this picture. What kind of rocks are found there?
(c) Do you think that roadbuilding is difficult there? Why do you think so?
(d) The north shore of Gaspé is very thinly populated. Suggest possible reasons, judging from this photograph.
2. 4—44 shows part of the village of Percé and famous Percé Rock, on the east coast of the Gaspé Peninsula.
(a) Notice the opening that gives this "pierced rock" its name.
(b) Refer to your atlas and name the body of water that can be seen in the distance.
(c) The coast on the east and south sides of the Gaspé Peninsula is rugged, but less so than on the north side. Which body of water is located along the



4—44 Percé Rock and the village of Percé (Quebec Publicity Bureau photo)

south coast? Percé is one of the most famous summer resorts in eastern Canada. Suggest reasons for this, judging from the photograph.

3. On an atlas map, notice where most of the towns of the Gaspé Peninsula are located.

(a) Make a statement about the distribution of the population.

(b) The interior of Gaspé is hilly and, in some places, mountainous. It is a sportsman's paradise, with much fishing and hunting. Locate Murdochville, site of a great copper deposit.

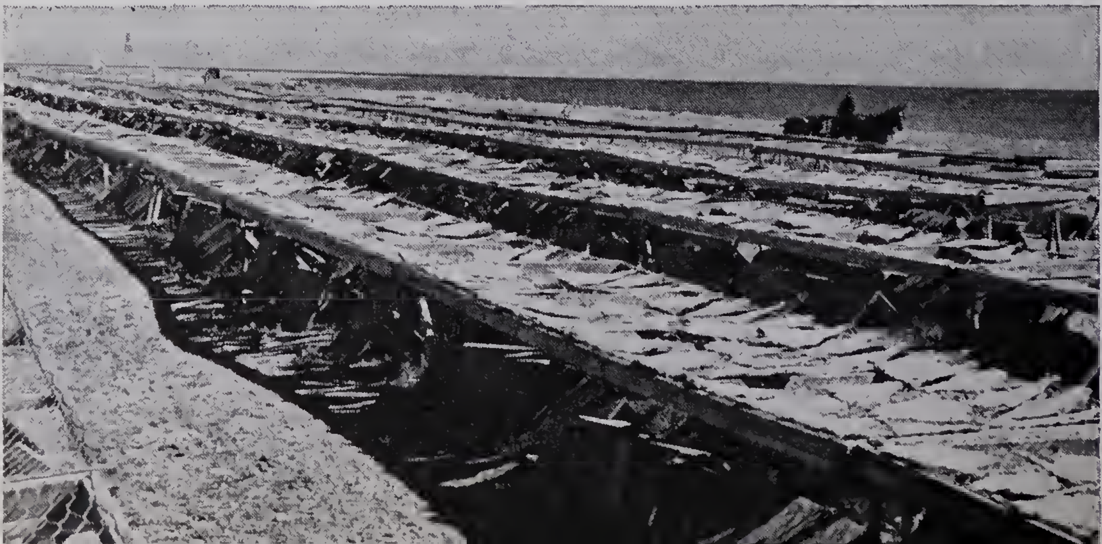
4. Figure 4—45 shows a typical coastal scene in one of the many villages along the Bay of Chaleur in Gaspé. Describe this scene and explain the purpose of the platforms shown in the picture. What important industry does this suggest in the region?

5. Use an atlas or wall map to calculate the distance from the town of Gaspé to Quebec and Montreal (a) by water (b) by road or rail. How does your answer help to explain the slow growth of this region? The climate is quite severe and the growing season is generally short.

The sea, the scenery, and the forests have been described as the chief natural resources of Gaspé. Forest industries are represented by one large pulp and paper mill at Chandler. Copper has been mentioned as a mineral resource and it is believed that other minerals of value, especially oil, may be mined in the future.

In summing up this study of the Gaspé Peninsula, state reasons for (a) the coastal distribution of the population; (b) the concentration

4—45 Fish drying on the shores of the Bay of Chaleur in Gaspé (Quebec Publicity Bureau photo)



of people along the south (instead of along the north) coast; (c) the slow growth of the region and the limited development of its resources.

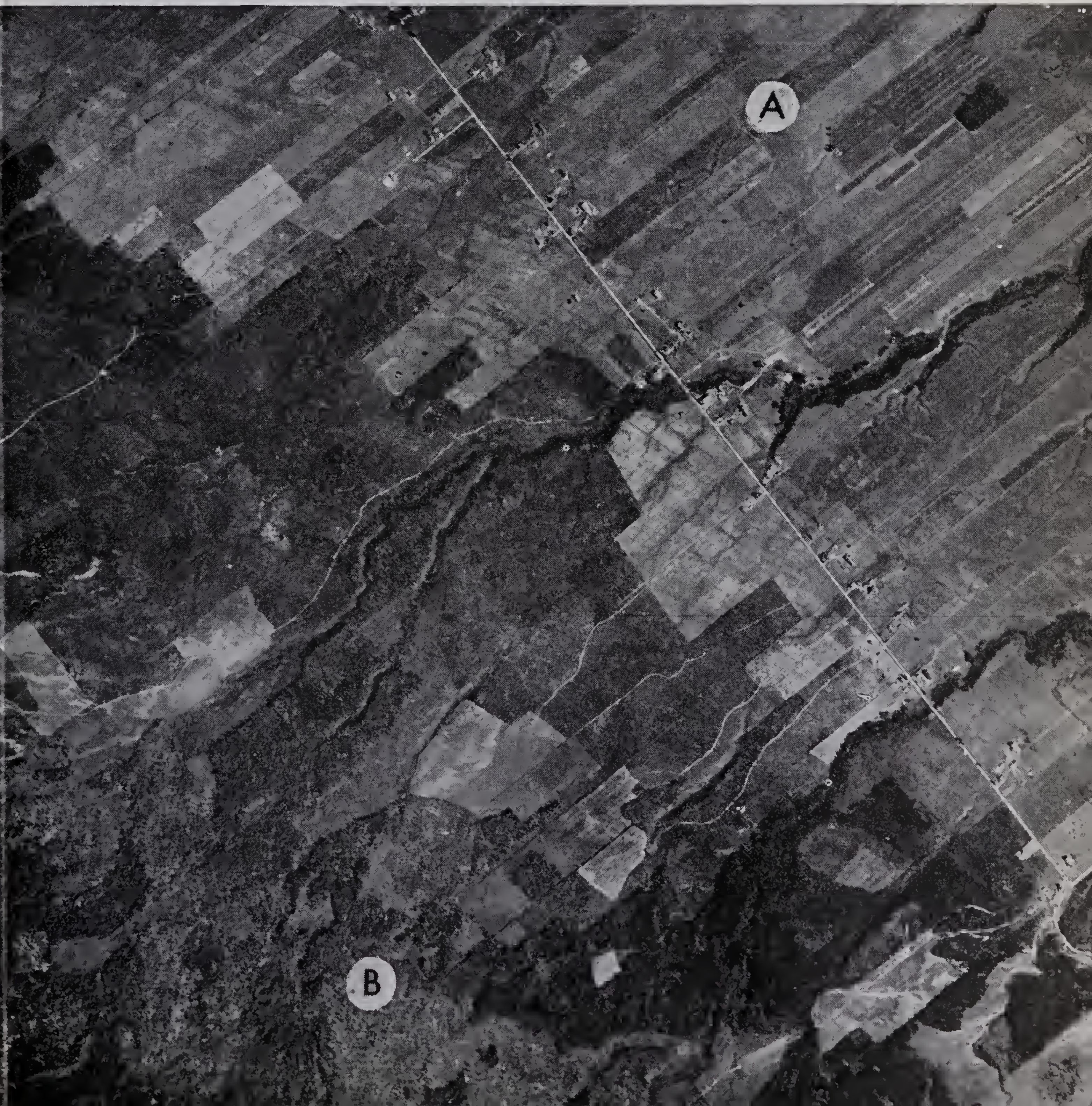
THE LAKE ST. JOHN-SAGUENAY REGION

It will be well to remember that this area has a frost-free season averaging only 120 days per year.

Contrasts in the Lake St. John-Saguenay Region

1. Study Figure 4—46 which provides a vertical aerial view of country in the Lake St. John Lowland. The area lettered A is the lowland, that lettered B is the nearby upland.

4—46 Vertical aerial view in the Lake St. John Lowland (R.C.A.F. photo)



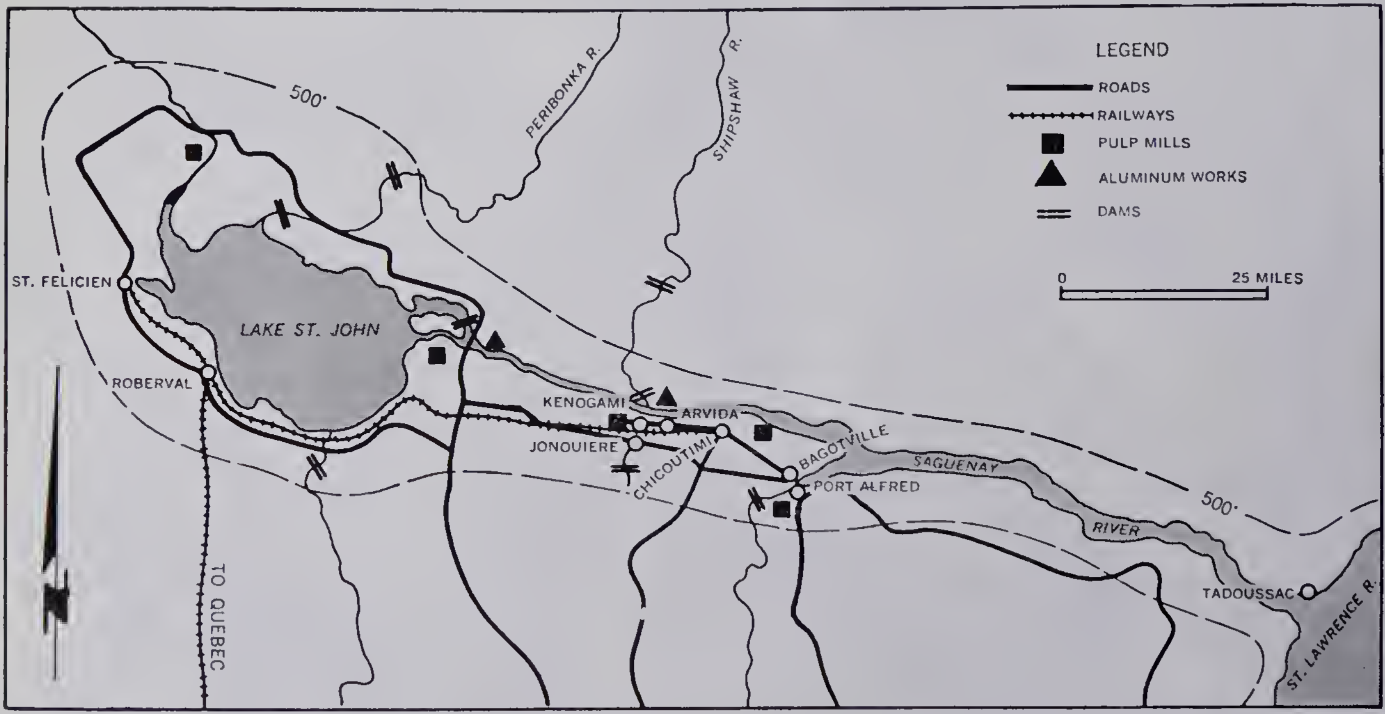
(a) Make a list of the differences between these areas. Your list should refer to vegetation, road patterns, settlement, and land use.
(b) Which features of the lowland area indicate that this photograph was probably taken in the Province of Quebec.

The Lake St. John-Saguenay region was invaded by the Champlain Sea. The soils and types of farming are quite similar to those of the St. Lawrence Lowlands. However, the growing season is usually shorter. Many hogs and poultry are raised and potatoes are a major cash crop. Most farm output is sold locally. The majority of the region's 250,000 people live in the towns shown in Figure 4-47. Most people in these towns are employed in three large industries: pulp and paper manufacturing, the making of aluminum, and the smelting of metals. All these industries have one thing in common: they require huge quantities of electricity. The raw materials used in some of them, especially in the making of aluminum, must be brought from distant places. As we study this region, we must think about two questions:

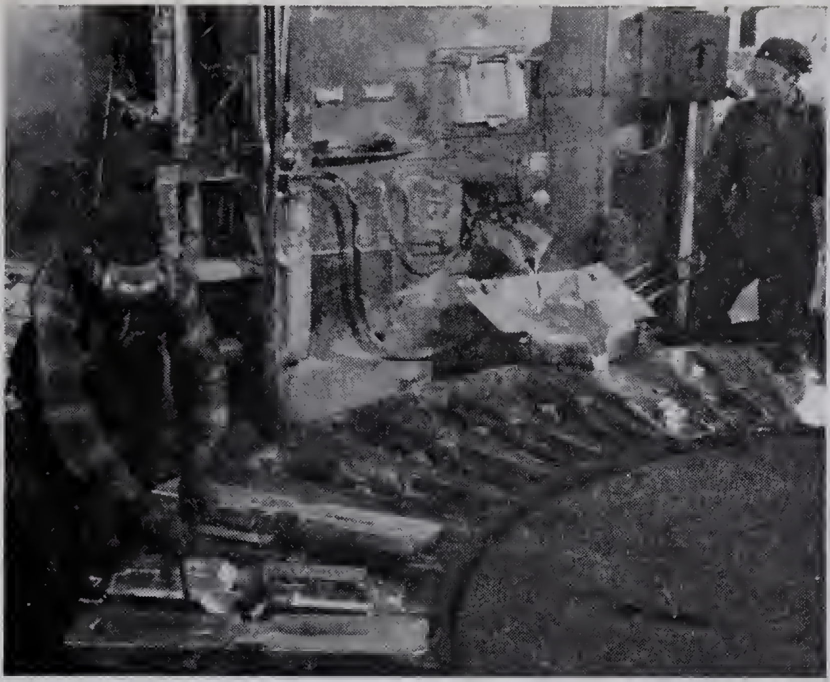
1. Why is it possible to produce vast quantities of electricity there?
2. Why is it profitable to bring raw materials from great distances to this remote area, and then to export the finished products equally great distances?

Quebec's great aluminum industry

1. Figure 4—48 shows two men at work in the great aluminum smelter at Arvida. Locate Arvida in Figure 4—47.



4—47 The Lake St. John-Saguenay Region



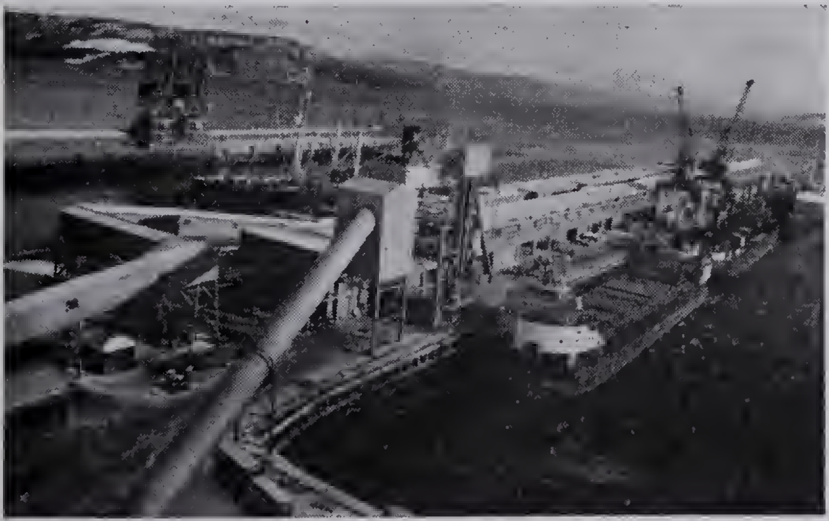
4—48 Casting aluminum ingots at Arvida (Aluminum Company of Canada Ltd. photo)

(a) What protective clothing are these men wearing? Why is such clothing necessary?

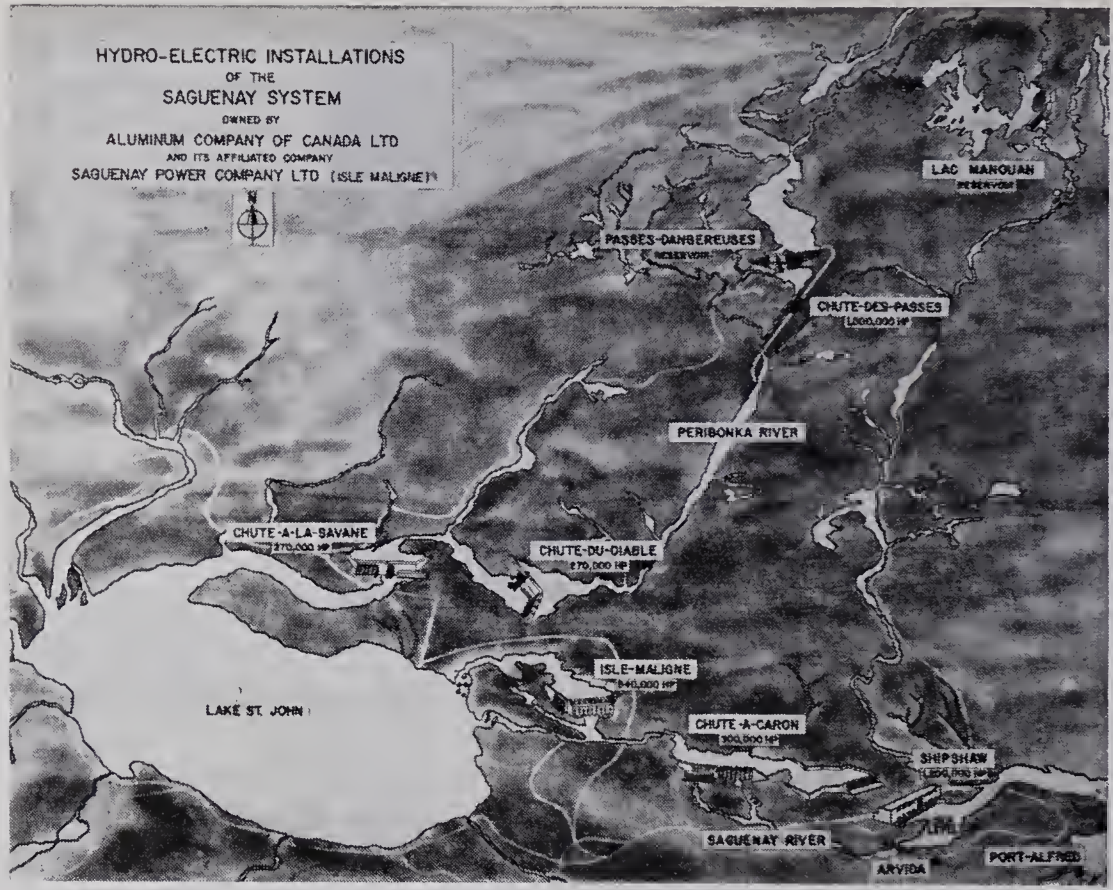
(b) The man at the left in the picture is lifting a slab of aluminum called an ingot. From other evidence in the picture, tell how an ingot is formed. The ingots are sent to factories elsewhere in Canada and the United States, where various aluminum articles are made from them. Name some important uses of aluminum. What qualities make it a very useful metal in our world today?

2. The furnace from which molten aluminum is flowing in Figure 4—48 is heated by electricity. To produce one ton of ingots such as those shown in the picture, requires as much electricity as you will use in your home during the next 15 years. Before finding out how so much electricity can be produced in the Saguenay Valley, let us consider what raw materials are needed and how they are obtained. Your atlas and an outline map of North America will be useful here.

(a) The ore of aluminum is called **bauxite**. Most of that used at Arvida comes from British Guiana. It is exported from Georgetown to Port Alfred on the Saguenay River. Study Figure 4—49 which shows a view of one of the docks at Port Alfred, with the ocean vessels that bring in bauxite and take out finished aluminum. In addition to bauxite from British Guiana, some is also



4—49 The docks at Port Alfred present a busy scene. Describe the shoreline of the Saguenay River in the distance. (Aluminum Company of Canada photo)



4—50 A semi-pictorial map of power development in the Lake St. John-Saguenay Region (Aluminum Company of Canada Ltd. photo)

imported from the Republic of Guinea in West Africa. There are no sources of this ore in Canada.

(b) Another raw material used is **cryolite,** from the west coast of Greenland.

(c) Fluorspar is a raw material obtained from Corner Brook in Newfoundland.

(d) Petroleum coke is shipped to Arvida from the coast of Texas.

What is the interesting thing about all these products? Use an atlas or wall map to trace the routes by which they are transported to Arvida. Like all St. Lawrence ports, those on the Saguenay are closed for several months each winter. It is necessary for the raw materials used at Arvida to be stockpiled for this season. Exports can be sent out in winter by road and rail.

3. Seven tons of raw materials are needed to make one ton of aluminum. These raw materials must be treated by electricity. Figure 4—50 will help to explain why Saguenay Valley can produce so much hydro-electrcity.

(a) Chute à Caron and Shipshaw are now two of the older developments in the system. Shipshaw was completed very quickly in 1943 because so much aluminum was needed by Canada and her allies during World War II. Why was so much aluminum needed?

(b) Name three reservoirs used to store water in the Saguenay system. Which river carries water from two of these storage basins into Lake St. John? From here, the water drops more than 300 feet in less than 30 miles. Vast quantities of electricity are generated. Where does the river reach sea level, according to Figure 4—50? This is the point where raw materials are received and aluminum is shipped out by means of large ocean vessels.

(d) In addition to the storage basins shown in Figure 4—50, there are thousands of lakes which serve as natural reservoirs in the Saguenay system. Review pages 166-168 where we learned why the Canadian Shield has so much water power. The Lake St. John-Saguenay Region receives about 40 inches of precipitation per year. Much of this occurs as snow. How does this fact help to explain why a remarkably even flow of water is available even during a dry summer?

4. Study Figure 4—51. This shows the Arvida smelter, one of the largest aluminum smelters in the world. Name two kinds of land transportation used here.

(a) Where is the Saguenay River in the photograph? Is the downstream area to the left or to the right in this photograph? The map in Figure 4—47 may assist you to answer this question.

(b) Describe the elevated land in the far distance. Name the physical region represented by it.

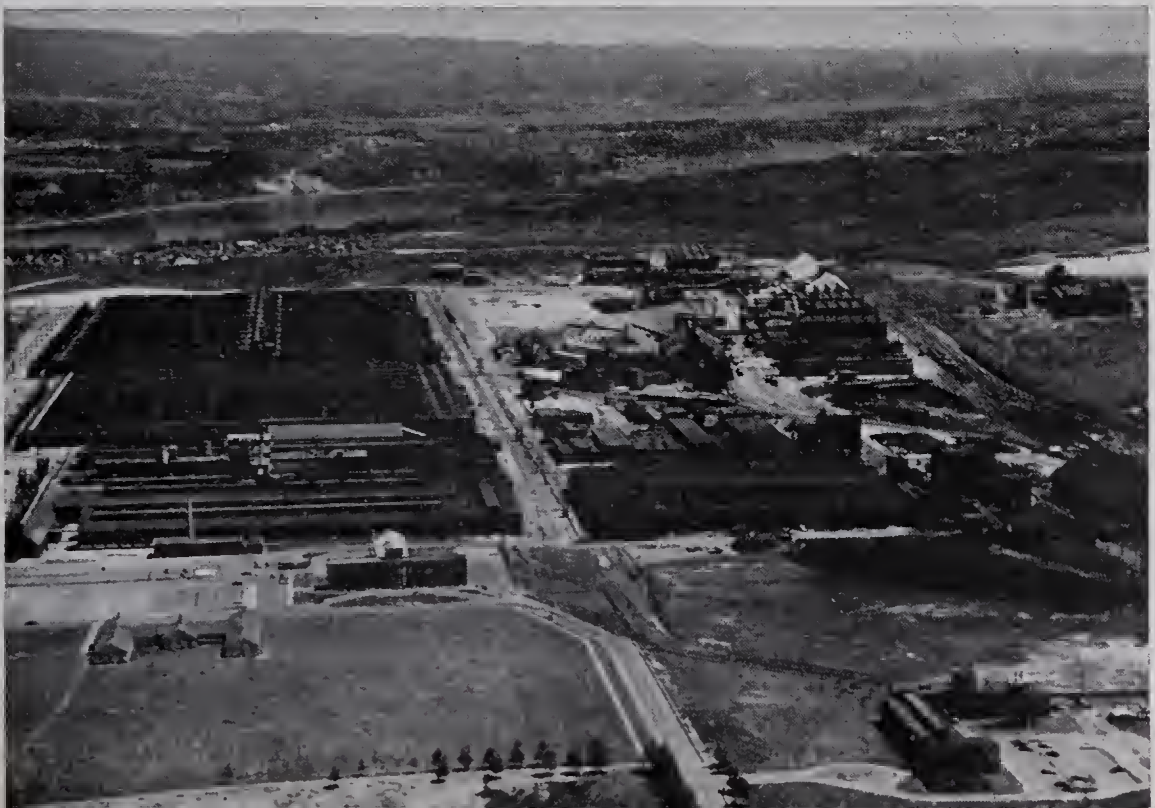
5. In addition to the smelter shown in Figure 4—51, there are smelters at Isle Maligne, Baie Comeau, Shawinigan Falls, and Beauharnois in Quebec. Another huge smelter is located at Kitimat in British Columbia. Refer to pages 395-396 for information about this. All these smelters except the one at Baie Comeau are owned by a single company.

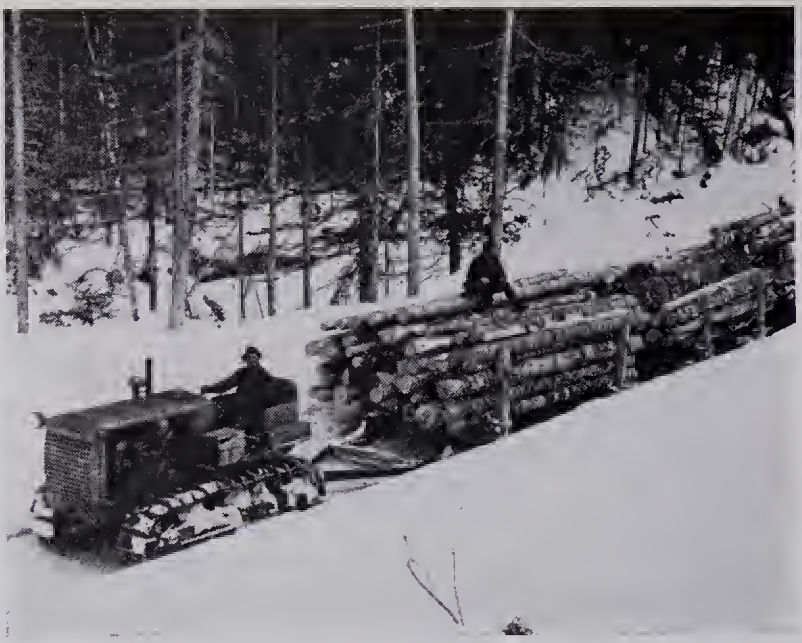
(a) On an outline map of Canada, use a suitable symbol to show the location of all the smelters just mentioned.

(b) Aluminum is fabricated at various centres in Canada including Shawinigan, Kingston, and Etobicoke in Ontario, and Vancouver in British Columbia. On your outline map of Canada indicate the location of these fabricating plants. That at Kingston is the largest. There, ingots are converted into forms (sheets, tubing, bars, etc.) that manufacturers can use.

(c) Aluminum ingots for use at the plants named above are shipped from Port Alfred by boat, and thence by rail and road to the factories. Where is the only plant that does **not** use Arvida aluminum? Explain why. Aluminum is sent to many other countries from Port Alfred. A great deal is exported to the

4—51 The great aluminum smelter at Arvida (Aluminum Company of Canada Ltd. photo)





4—52 Hauling logs in a forest in the Saguenay Valley (Quebec Publicity Bureau photo)

United States. Canada can use only a small part of her production. The deep-water navigation available on the Saguenay River has been a major factor in the location of the industry in this region.

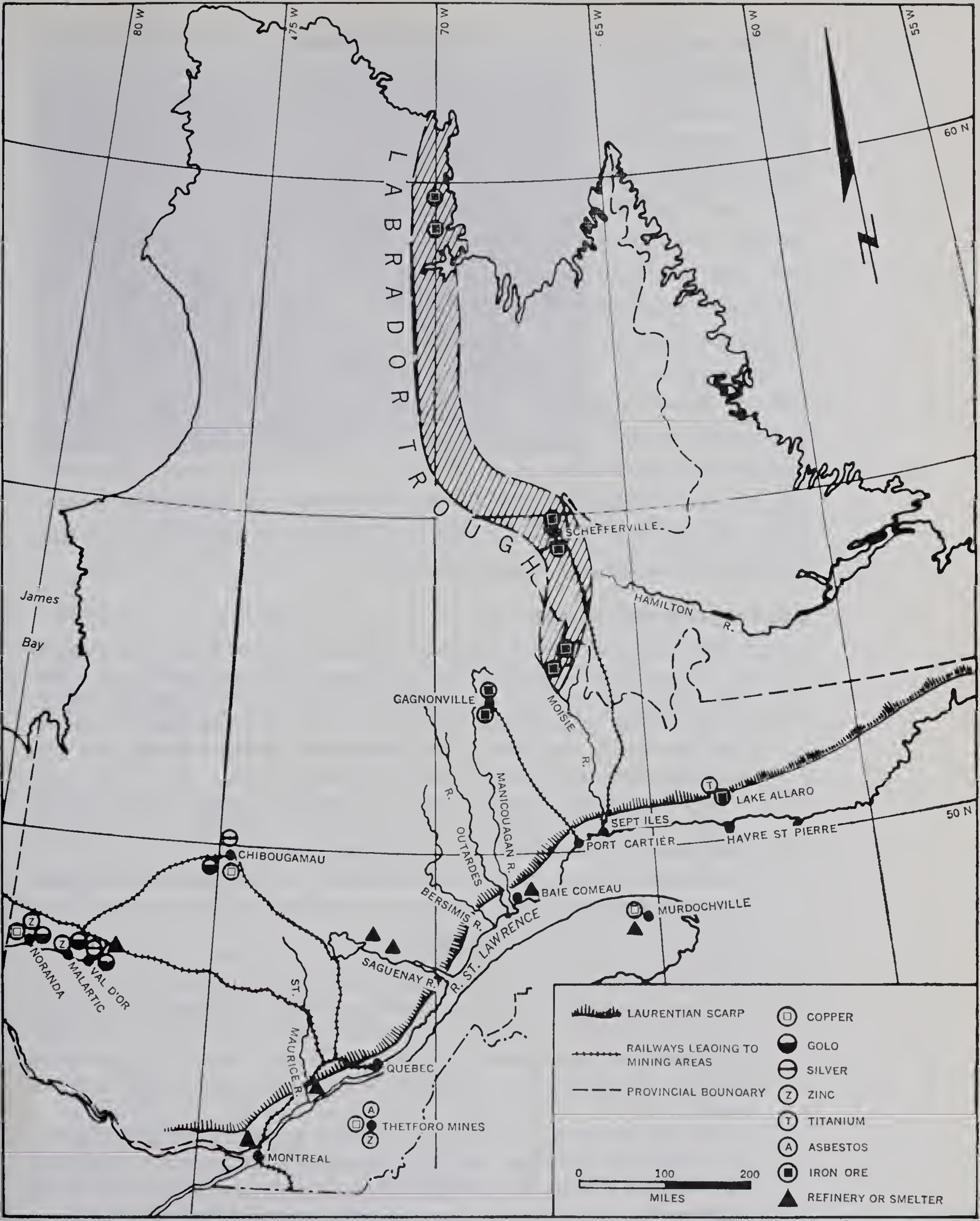
6. Refer again to the two questions on page 182. Explain how our study of the aluminum industry has helped us to answer them.

The importance of cheap electricity in the production of pulp and paper was noted in Chapter 3. It is not surprising to learn that the Saguenay Valley is one of the world's great producers of these goods. Name the chief centres of production, according to Figure 4-47. Study Figure 4-52. Describe the method of transporting logs that is used in this region. Why is transportation often easier in winter than at other seasons? Some lumber cut in this region is processed in saw-mills. Pine and fir are important sources of pulpwood.

The smelting and refining of base metals is another industry that requires large amounts of electricity. In 1958 a large smelter-refinery went into operation at Chicoutimi. This plant treats nickel-copper ores. Another plant in the region smelts lead and zinc that are mined at Chibougamau. Where is this town in relation to the Saguenay Valley? Refer to your atlas if necessary. A highway and a railway now connect Chibougamau to the Lake St. John-Saguenay region.

THE ST. LAWRENCE NORTH SHORE, LABRADOR, AND "NEW QUEBEC"

The St. Lawrence north shore is a name often given to the region that extends northeast from the mouth of the Saguenay River. It lies opposite the Gaspé Peninsula and is drained by several great rivers that flow down from the Canadian Shield. These rivers include the Bersimis, Manicouagan, Outardes, and Moisie. Locate them on an



4—53 Mineral wealth of Quebec

atlas map. Note the *Laurentian Scarp* in Figure 4-53. This is the southern edge of the Canadian Shield that you viewed in Figure 4-35. It is over this scarp that the great rivers fall in their journey to the

St. Lawrence. Huge hydro-electric developments are underway on the first three named above. These will rival the output of the St. Maurice and Saguenay when fully developed. Power from the great Bersimis generators is already flowing to Quebec and Montreal. It is also being transmitted by underwater cable across the St. Lawrence to Gaspé. The Murdochville copper smelter receives its power from this source. Locate the town of Baie Comeau in Figure 4-53. Name one industry here that uses large quantities of electricity. By 1965, the Manicouagan River will be harnessed at two dams to produce huge quantities of electricity. One of these dams will be the highest in North America.

Three ports of the St. Lawrence north shore region include Port Cartier, Seven Islands, and Havre St. Pierre. Seven Islands (*Sept Iles* in French) is especially interesting as a port that in some recent years has handled more cargo tonnage than any in Canada except Montreal. Let us see if we can account for the importance of this rather remote St. Lawrence port. To do so will require us to study the region that includes Labrador and New Quebec.

Labrador — a land of iron

1. Officially, Labrador is the name given to the mainland part of the province of Newfoundland. Trace the boundary between Quebec and Labrador in Figure 4—53. The term "Labrador" also applies to much of the neighboring area of Quebec. To the north, towards Ungava Bay, the region is often called "Ungava." "New Quebec" is still another name applied to a rather indefinite area that extends as far west as Hudson and James bays.

2. Notice the various rivers that drain in different directions from the centre of the Labrador-New Quebec region. Describe the course of the Hamilton River. There has been some power development on this river.

3. Describe the course of the Labrador Trough, according to Figure 4-53. There the rocks have been folded, and contain vast quantities of iron ore, the most important resource of the whole region.

(a) Locate the town of Schefferville. In this area, the iron ore deposits lie on both sides of the Quebec-Newfoundland border.

(b) Surface mining is the method used there. Where in Ontario is iron mined in the same way? The ore is within 15 feet of the surface and after the **glacial overburden*** has been removed, is quite easy to mine. One pit at Schefferville contains 20,000,000 tons of ore, averaging 60 percent iron content. What does this mean?

4. After the ore has been mined, it is carried to a crushing and screening mill by a continuous belt. After crushing and screening (during which waste rock and low-grade material are removed) the ore is ready to be transported by rail to the coast.

(a) What is the advantage of crushing and screening the ore before shipment?

(b) Use Figure 4—53 to trace the course of the railway south from Schefferville. What is the approximate length of this line? Where does it terminate? This

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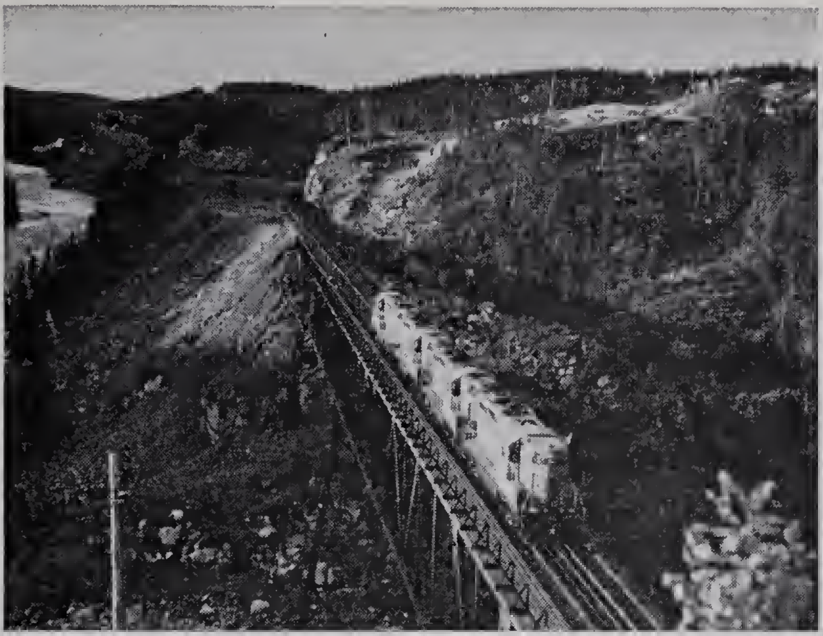
*This is a general term for material, sometimes called *glacial drift,* that has been deposited by a glacier. The overburden consists of sand, gravel, clay, rocks, and other material.



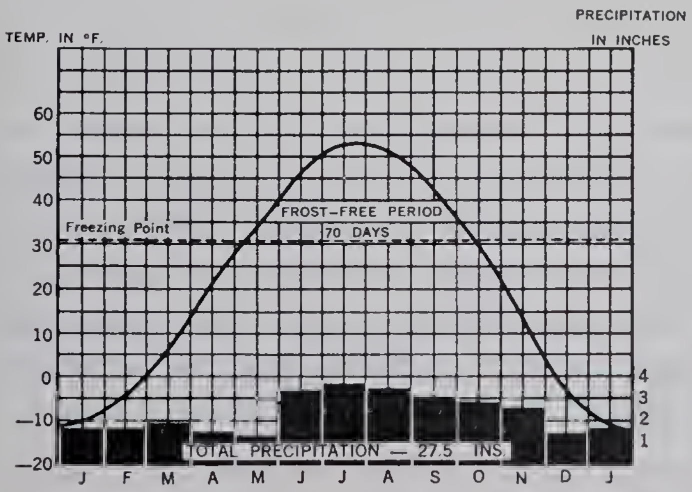
4—54 Hauling ore on the Quebec, Labrador, and North Shore Railway (The Iron Ore Company of Canada Ltd. photo)

line was one of the most difficult to build in Canadian history.

(c) Study Figure 4—54. How does the picture tell us that this was a difficult railway to build? The locomotives are hauling 125 ore cars to Seven Islands. Each contains 87 long tons of iron ore. The journey takes about 15 hours.

In 1961, nearly 8,000,000 tons of iron ore were shipped from Seven Islands. In less than ten years this port developed from a tiny, waterside village into a bustling town of 22,000 people. As we noted earlier, Seven Islands is now one of Canada's busiest ports. Much of the iron ore is shipped on giant freighters to American ports such as Cleveland and Toledo, on Lake Erie, and some is used at Hamilton. The opening of the St. Lawrence Seaway in 1959 greatly speeded up the transportation of the ore. Considerable quantities are also shipped to Philadelphia, Baltimore, and other Atlantic ports of the United States.

Climate is a major handicap to the development of the interior of Labrador-New Quebec. From the beginning, it has caused difficulties to the mining community at Schefferville. The reason is evident in the climatic graph (Figure 4-55) for nearby Knob Lake.



4—55 Climatic graph of Knob Lake

Labrador — a land of harsh winters

1. (a) How many months are below freezing at Knob Lake?
(b) Compare January and July temperatures here with those for your home area.
(c) Although the frost-free season for this station is given at 70 days, July is the only month throughout most of the Schefferville area when no frosts occur. How does this help to explain the fact that all food at Schefferville must be expensive as a result? What features of the physical geography of the Canadian Shield, apart from the harsh climate, would make farming difficult?
2. Compare (a) the total snowfall and (b) the total precipitation at Knob Lake with figures for your home area. The snowfall is one of the heaviest in Eastern Canada. How would it affect mining operations at Schefferville? In 1961, production began on May 1st and ended on October 28th.

The high-grade iron ore deposits around Schefferville will last for many years. In addition, there are known to be vast lower-grade deposits in the area. Moreover, there are high-grade ores far to the north, as shown in Figure 4-53. On which shore of Ungava Bay are these located? Although these ores could be moved out by cheap water transport via Hudson Strait, the navigation season there is only three months long. It is possible that, some day, the railway will be extended north from Schefferville. In that case, how would the Ungava ores be shipped to market?

Other rich iron deposits exist to the south of Schefferville. To the southwest is the new town of Gagnonville. High-grade ores are transported to the coast by a railway that was completed in 1960. Name the port that serves this mining project.

An important development along the St. Lawrence north shore is the mining of titanium at Lake Allard, where there is one of the world's largest deposits of *ilmenite*, the ore of titanium. This light metal has many industrial uses. From it, for example, is produced a white pigment, valuable in making paints, enamels, and plastics. Locate Havre St. Pierre on your atlas. Ilmenite is shipped from there up the St. Lawrence to Sorel where it is refined. The Sorel smelter uses vast quantities of electricity from Shawinigan Falls. The ilmenite contains a considerable iron content and the Lake Allard deposits are a valuable source of that metal.

There are great water-power and forest resources in the interior of Labrador-New Quebec. The Hamilton River alone could probably produce more than 1,000,000 kilowatts of electricity. The extensive forests east of Goose Bay may soon be exploited for pulp and paper. Elsewhere, the forests are less productive. Much of the region consists of bare rock, swamp, and muskeg, similar to parts of Northern Ontario, as shown in Figure 3-4.

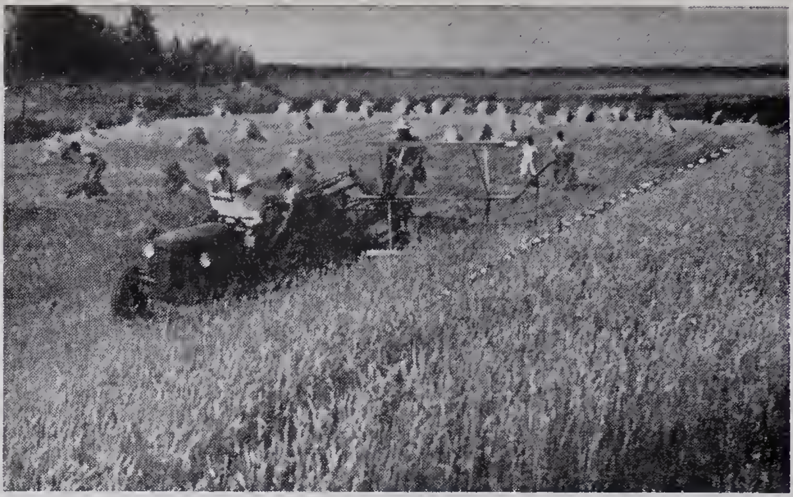
The resources just mentioned belong to the Newfoundland section of the region. It is important, too, to remember that a large fraction of the iron-ore resources are in that province. It is more convenient for us to discuss Labrador here, while we study the province of Quebec. Most of the fishing industry is conducted by Newfoundlanders. These include two or three thousand people, mainly Indians and Eskimos, who live in scattered settlements along this bleak coast. Some idea of its harsh and uninhabited nature may be gained from a study of Figure 5-15 on page 210. Further attention will be paid to Labrador in Chapter 5.

It is important to remember that the region of the St. Lawrence north shore, Labrador, and New Quebec is larger than most Canadian provinces. Yet it includes fewer people than an average Ontario town, such as Guelph. Most of these people live along the coast. Apart from one or two mining settlements such as Schefferville and Gagnonville, almost no one lives in the interior. This is one of the great empty areas of Canada. Someone has called it "a land of snow and iron." This is a good description because it emphasizes one of the region's greatest problems — climate; and its greatest resource — mineral wealth. It is likely that more minerals will be discovered in the future. In fact, a large asbestos deposit has already been found near Ungava Bay. From your studies so far, try to suggest the problems that will be met in developing such mineral resources in the future. If the railway should ever be extended from Schefferville to Ungava Bay, estimate the distance that ores would have to be transported by rail and water to Montreal and Toronto.

Like Northern Ontario, Labrador-New Quebec will never be densely populated. At best it will consist of a few widely-scattered settlements, with occupations based on two or three primary industries. What occupations will these be? Why is the region unlikely to have any agriculture of the type found in the Clay Belt of Northern Ontario?

THE MINING BELT OF NORTHWESTERN QUEBEC

This region includes the Quebec section of the great Clay Belt that we studied in Chapter 3. Review pages 124-128 in that chapter. You learned there that farmers entered this region before the first mines were opened. Review the climatic graph for Kapuskasing in Figure 3-21. Conditions are very similar to this in the Quebec Clay Belt. Remember that longer summer days make up for the fact that the growing season is shorter there than in the St. Lawrence Lowlands. There is more cultivated land, and farms are more numerous in the Quebec Clay Belt than on the Ontario side. The region occupies the



4—56 Harvesting wheat on the Trepanier farm in Temiskaming County (Quebec Publicity Bureau photo)

bed of a vast glacial lake that existed there thousands of years ago. This lake bed consists of fertile clay which as you learned in Chapter 3, gives the Clay Belt its name. For many years, the Quebec government has encouraged colonists to take up farming there. The result is shown in Figure 4-56.

Why is the Mining Belt the chief populated region of the Canadian Shield in Quebec?

1. The photograph shows Mr. Joseph Trepanier and his family working on their farm in Temiskaming County in Western Quebec. Locate this county on an atlas map of Quebec.

(a) What crop is being harvested, according to the caption? What information does this give you about the growing season in the Quebec Clay Belt?

(b) Describe the methods being used to harvest the crop.

(c) Describe the relief of the land. The Clay Belt has been described as an island of fertile land in the heart of the Canadian Shield. In what ways does this land look different from most of the Canadian Shield?

Most of the farmland is devoted to hay and pasture crops. The dairy products and vegetables produced for the local market are the main source of farm income. The mining towns provide good markets and enable farmers such as Mr. Trepanier to make a good living.

2. Although farming is important in Northwestern Quebec, the term "Mining Belt" indicates the greater importance of another industry in this region. Study Figure 4—53.

Name the most important mining centres shown on the map. The region produces more than half of Quebec's mineral wealth. All of the province's 18 producing gold mines are in this district. What other minerals are produced, according to the map? Most of the mines were established between 1923 and 1937.

3. Locate Chibougamau on the map in Figure 4—53. This is the site of one of the largest copper developments that has been seen in Canada for many years. Chibougamau is outside the Clay Belt, but belongs to the Mining Belt of Northwestern Quebec.

(a) In which direction does Chibougamau lie from the other mining centres mentioned?

(b) With what region already studied is it connected by road and rail?

(c) Where are the ores smelted? You may need to refer to Figure 4—47.

Of Quebec's 20 active copper mines, 16 are located in the Clay Belt. Zinc and small quantities of lead, silver, and other minerals are produced in association with the gold and copper ores. More than 10,000 miners are employed in the region. The work of one miner is said to provide employment directly or indirectly to 11 other workers. Make a list of some jobs, outside the direct production of mineral ores, which are dependent on the mining industry. In doing so, think of all the work involved between the actual digging of a mineral ore to the final production of a metal product (such as copper wire, lead piping, and so on). This will help to explain the importance of the Mining Belt to the prosperity of Quebec Province.

Understanding the "personality," potentials, and problems of Quebec

1. The regions of Quebec studied in this chapter are listed below. Underneath the list is a series of 12 statements. Each statement applies to one region. List the numbers 1 to 12 in your notebook and beside each number write the name of the region to which the statement refers.

Regions: St. Lawrence Lowlands; The Laurentians; "La Mauricie"; The Eastern Townships; The St. Lawrence South Shore; Gaspé; The Lake St. John-Saguenay Region; The St. Lawrence North Shore and New Quebec; The Mining Belt of Northwestern Quebec.

(1) There vast hydro-electric plants provide power for one of the world's largest aluminum smelters.
(2) Provides a mountain playground for Montrealers.
(3) This area was originally settled by English-speaking people.
(4) This is Canada's largest iron-ore producing region.
(5) This is one of Canada's largest gold-producing regions.
(6) This river valley serves as the hinterland of Three Rivers.
(7) This is the world's major producing region for asbestos.
(8) Practically all food must be brought into the region from the outside.
(9) Most of Quebec's copper production is concentrated in this region.
(10) The Monteregian Hills are the only important relief features in this region.
(11) This is the most densely populated and oldest settled region, where the first colonists established their farms in long, narrow, riverfront strips.
(12) The main river of this region provides ten major power sites as it drops 1400 feet in its rapid course to join the St. Lawrence.

2. Water pollution is a serious problem facing many parts of Quebec.
(a) Which regions have the biggest problems? Why?
(b) Which activities of man contribute most to water pollution in Quebec.
(c) In what ways could water pollution be a costly problem to Quebec now and in the future?

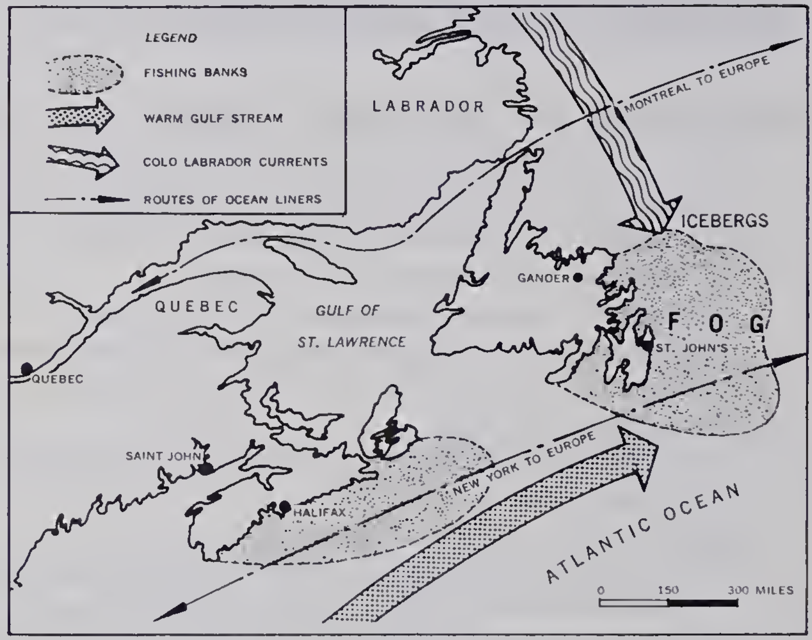
3. Describe conservation measures that are being applied on the farms and in the forests of Quebec.

4. (a) In what ways is Quebec "a blend of old and new"?
(b) What advantages make it the second great industrial province of Canada.
(c) List the resources, industries, and products in which Quebec leads Canada.

5. Refer again to Figure 2—67 on page 101.
(a) Name the three major physical divisions of Canada found in Quebec.
(b) Which geographical regions are located in each physical division?

CHAPTER 5

The Atlantic Provinces: Canada's Sea-Girt Eastern Fringe



5—1 A dangerous busy highway — the North Atlantic off the Atlantic Provinces

FOUR PROVINCES ON A BUSY OCEAN HIGHWAY (Figure 5-1)

1. Why is this sometimes a dangerous highway, even for vessels equipped with modern devices?
2. (a) How do icebergs manage to get so far south?
(b) In what way do ocean currents cause fog?
3. Why are fish so important to the people of this region?
4. Why are these waters among the busiest in the world for ships?

Despite a location which means that major ocean vessels frequently pass through these waters, the Atlantic Provinces are isolated in many ways. That is why the title of this chapter refers to the region as "Canada's sea-girt eastern fringe."

The 1961 population statistics for the region were:

Nova Scotia	737,007
New Brunswick	597,936
Prince Edward Island	104,629
Newfoundland (including Labrador)	457,853
Total	1,897,425

Compare this total with that of Greater Montreal in 1961, as given in Table 2b on page 487. The population figures raise the question as to why, despite being the earliest settled, the Atlantic Provinces have grown so slowly that their population is now less than that of Greater Montreal.

Where do the people of the Atlantic Provinces live? (Figure 5-2)

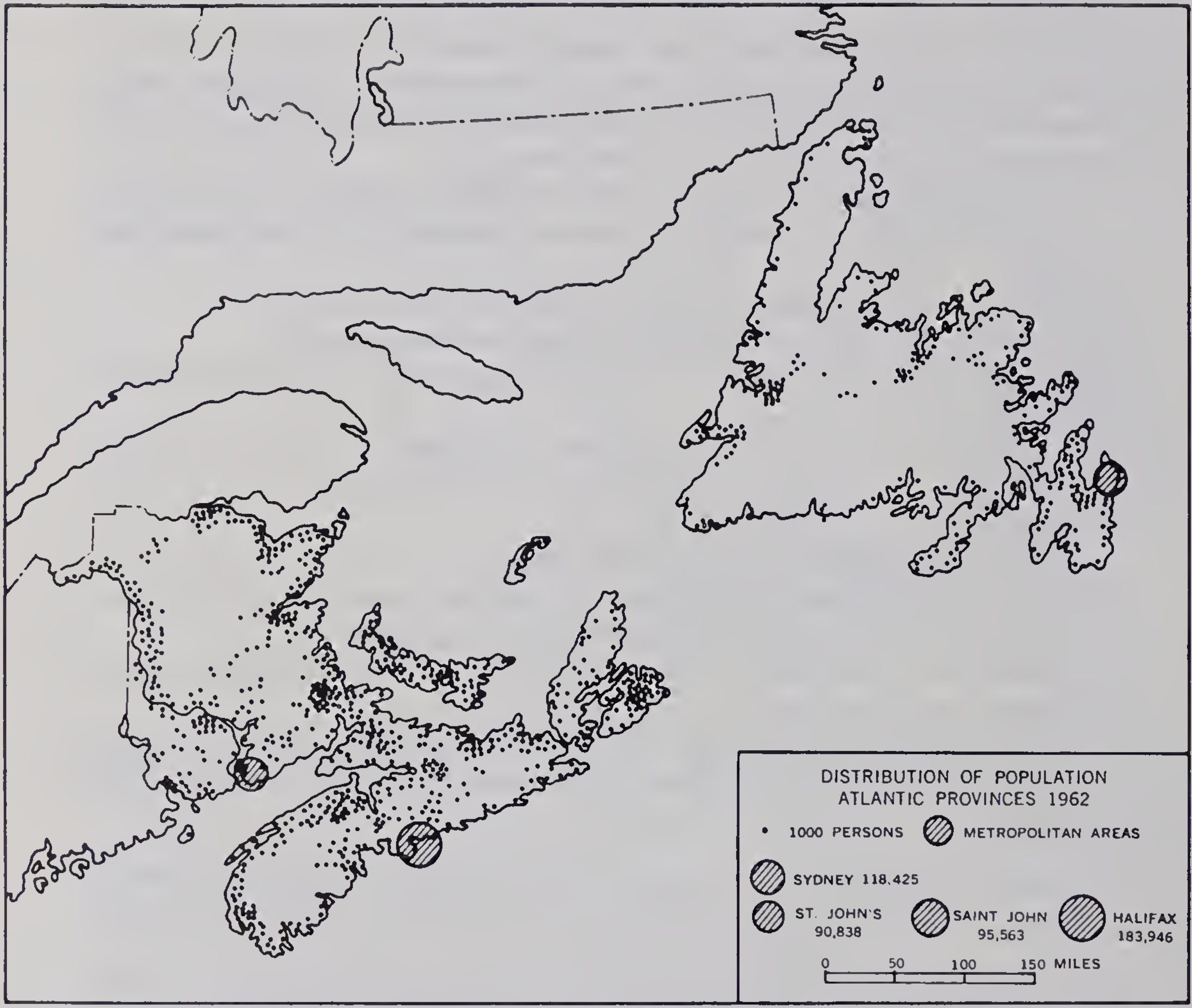
1. (a) Name the four Atlantic Provinces. Why is this a good general name for them?
(b) Which Atlantic Province is the largest in area? This province includes a large island and an even larger territory to the north. Only part of this territory appears on the population map. What is it called? It contains very few people.
(c) Name the smallest province in the group.
2. In which province are the people most evenly distributed over the land?
3. (a) Describe generally where the people of Newfoundland and Nova Scotia live.
(b) Why do very few people live in the interior of these provinces?
4. (a) Which part of New Brunswick contains very few people?
(b) Along which river valley of that province do many people live? Why do they live there?
(c) Where do the rest of New Brunswick's people live?
5. The three largest cities of the Atlantic Provinces appear as three circles on the map.
(a) Refer to Figure 5—4 and name these cities.
(b) Other cities appear as clusters of dots. Name a large city of Cape Breton Island that shows up on the population map in this way.
(c) Name one city of Prince Edward Island and two other important cities in Southern New Brunswick.
6. Study the pictures shown with the population map. These pictures illustrate many occupations besides fishing. Name some occupations shown by these pictures.

A study of the population map leads to another major question to be considered in this chapter:

> Why do most of the people live along the coasts or in river valleys, while the interior areas are very thinly populated?

In spite of the fact that fishing is less important than it used to be, more people look to the sea for a living than in any other region of Canada. No other region obtains such a large fraction of its wealth from the sea. These facts are illustrated by the following statistics:

Statistics for 1959	Persons engaged in fishing	% of Canadian total	Value of fisheries produce	% of Canadian total
Nova Scotia	13,012	17	$27,112,000	26
New Brunswick	6,382	8	8,763,000	8
Prince Edward Island	3,260	4	4,287,000	4
Newfoundland	18,430	23	14,529,000	14
Totals	41,084	52	$54,691,000	52



5—2 Population distribution in the Atlantic Provinces in 1956. Various occupations are shown in the photographs: (a) lumbering in northern New Brunswick, (b) mining in Cape Breton, Nova Scotia, (c) farming in New Brunswick, (d) shipbuilding in Nova Scotia, and (e) fishing off the Newfoundland coast.

Which of the four provinces has the largest number of people engaged in fishing? Which has the most valuable fishing industry? These figures lead us to another major question to be answered in this chapter:

> Why do so many people in the Atlantic Provinces look to the sea for their life and trade?

Although the catching and processing of fish remains the chief occupation of many people who live along Canada's east coast, it is not the only one. In many ways, the fishing industry is less important than it used to be. Let us now try to find out what resources the land provides and what occupations, based on these resources, are open to the people. It will also be worth investigating the problems of conservation and development of their resources which the people of this region face.

What does the land of the Atlantic Provinces look like? (Figure 5-3)

1. (a) Which province consists entirely of lowland? There is no land in this province more than 500 feet above sea level.

(b) Describe the appearance of this land as shown in Figure 5—3a.

(c) How does this picture show that the land is being put to full use by the people?

(d) How does the map help to explain why the population is so evenly distributed throughout this province?

2. Study the coastline of Newfoundland Island.

(a) How does it help to explain why so many people live along the coast? Notice that the southeastern area, where so many of the people live, is called "upland" on the map.

(b) Study the photograph of St. John's in Figure 5—3b. In the background we can see part of the upland. Is it very high? Describe the shape or relief of the surface.

(c) Which side of Newfoundland is highland? This area includes the highest point on the island. Compare its elevation with the highest point in your neighborhood.

3. Study Figure 5—3c. This shows part of the Cape Breton Highland.

(a) In which part of Cape Breton Island is this area?

(b) What do you notice about the surface of this highland as it appears in the distance in this photograph?

(c) This photograph was taken in a Canadian national park. What features of this scenery would attract many visitors to the area? Why do so few people live here permanently?

4. (a) Of what type of country does most of the Nova Scotia mainland consist?

(b) Does the population map show that many people live in the interior of this province?

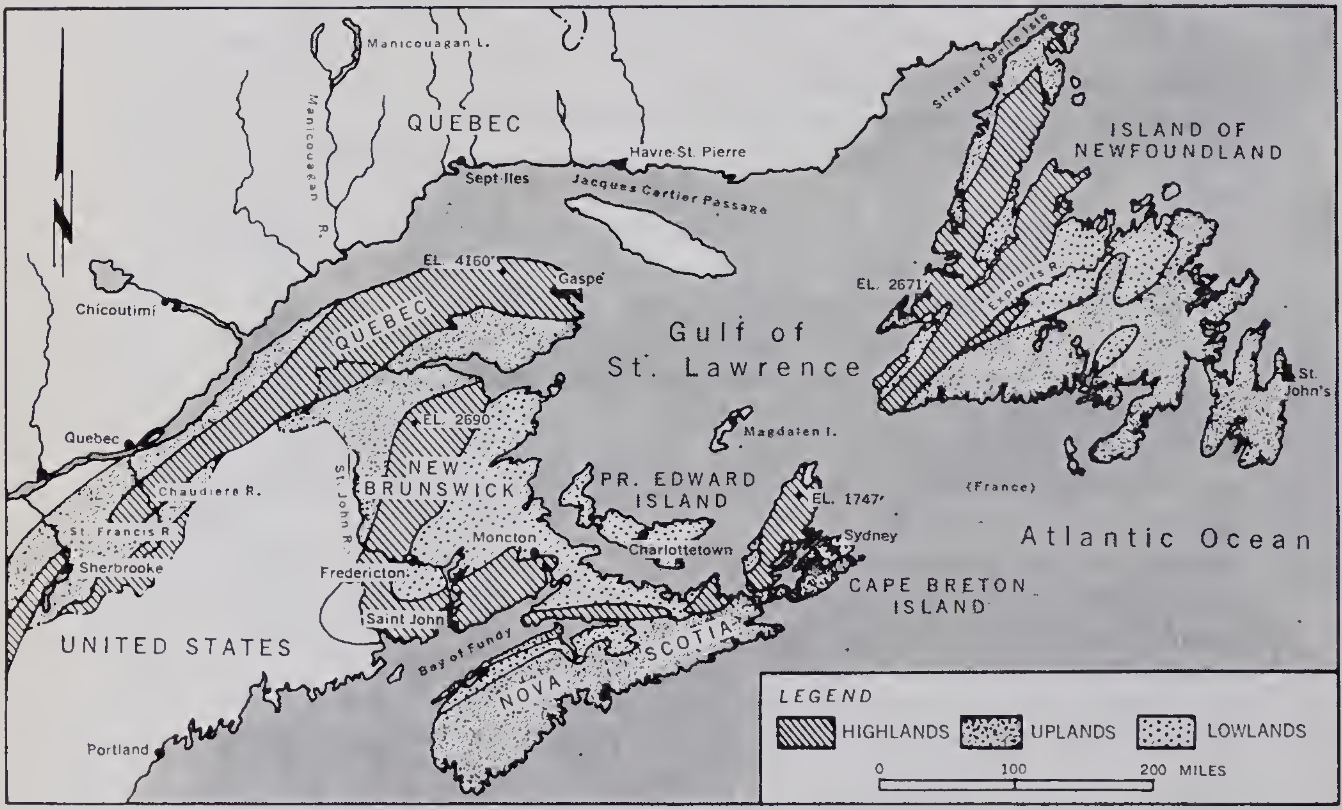
(c) How does this map help to explain why so many people live along the south coast?

5. The relief map shows that all three kinds of country—lowland, upland, and highland—are found in New Brunswick. No place reaches an elevation of 3000 feet.

5—3 Highlands, Uplands, and Lowlands in the Atlantic Provinces (after the Geological Survey of Canada). Study the pictures which will help you to understand what each kind of land looks like.

(a) Prince Edward Island Lowland

(b) St. John's, Newfoundland



(c) Cape Breton Highlands National Park

(d) St. John River Valley, New Brunswick

(a) How does this compare with the highest elevation in your neighborhood?
(b) Figure 5—3d shows a view of the St. John River Valley. The St. John is the largest river of the Atlantic Provinces. Why do so many people live in its valley?
(c) Northwestern New Brunswick consists entirely of uplands and highlands. Which province borders New Brunswick in this area? Why has travel between these two provinces always been difficult? This has helped to set the Atlantic Provinces apart from the rest of Canada. It has caused them to look towards the sea instead of inland for their trade and livelihood.
(d) Which great Canadian river serves as a route between the Atlantic Provinces and southern Quebec and Ontario? Why is this route of no value for part of the year?
(e) Refer to an atlas or wall map and calculate the distance by train or by car from Toronto to Halifax.
6. Use an atlas or wall map to find Sable Island, off the south coast of Nova Scotia.
(a) What is its latitude? What is the latitude of the northern tip of Labrador? How many miles separate Sable Island from northern Labrador?
(b) What is the longitude of St. John's? How many miles is St. John's from Liverpool, England? How many miles is it from Fort William, Ontario?
7. Refer to a map showing Canada's time zones. When it is 9 a.m. in St. John's, what time is it in Toronto? In Winnipeg? In Vancouver?

The regions of the Atlantic Provinces are shown in Figure 5-4. Each province will be studied in turn. All except Prince Edward Island have been divided into smaller regions. These studies should supply answers to such questions as:

What is each region of the Atlantic Provinces like?
How is it similar to or different from the place where we live?
What are the problems facing the people who live there?

NEWFOUNDLAND

An old sea song of Newfoundland tells of the wreck of the steamship *Ethie* in 1919:*

"She being the steamboat employed on our shore
To carry freight, mail and passengers to the Labrador."

The song goes on to tell us that:

"On the tenth day of December as you all well may know,
In the year nineteen nineteen on her last trip did go. . . ."

"The glass indicated a wild raging storm
And about nine o'clock the storm did come on. . . ."

"At first to the storm the brave ship gave no heed,
Until at length it was found she was fast losing speed,
And the great waves all around her like great mountains did rise,
And the crew all stood staring with fear in their eyes. . . ."

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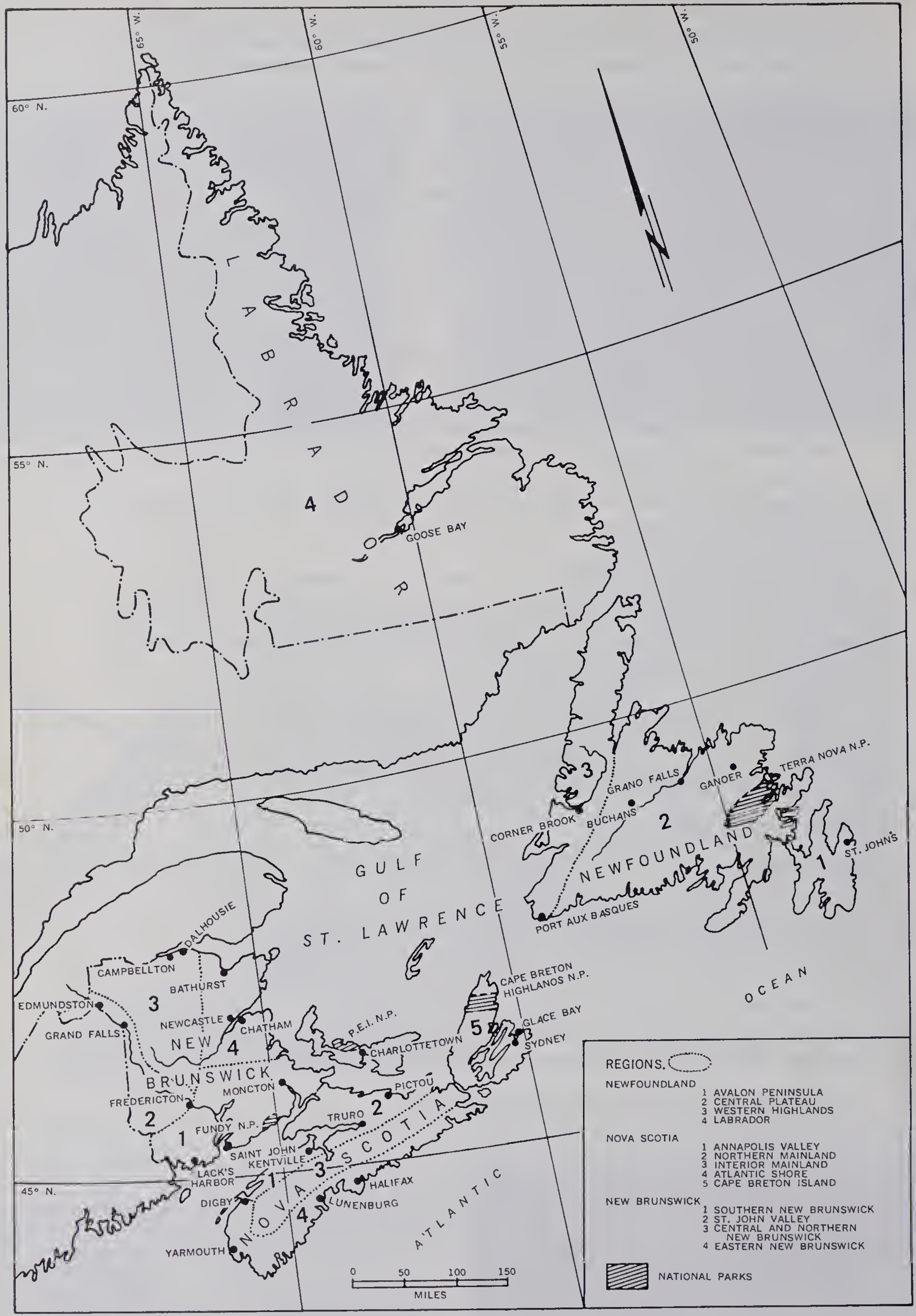
*From *Ballads and Sea Songs of Newfoundland,* words by Maude Roberts Simmonds, quoted from *Historic Newfoundland* by L. E. F. English, published by Newfoundland Department of Economic Development, St. John's.



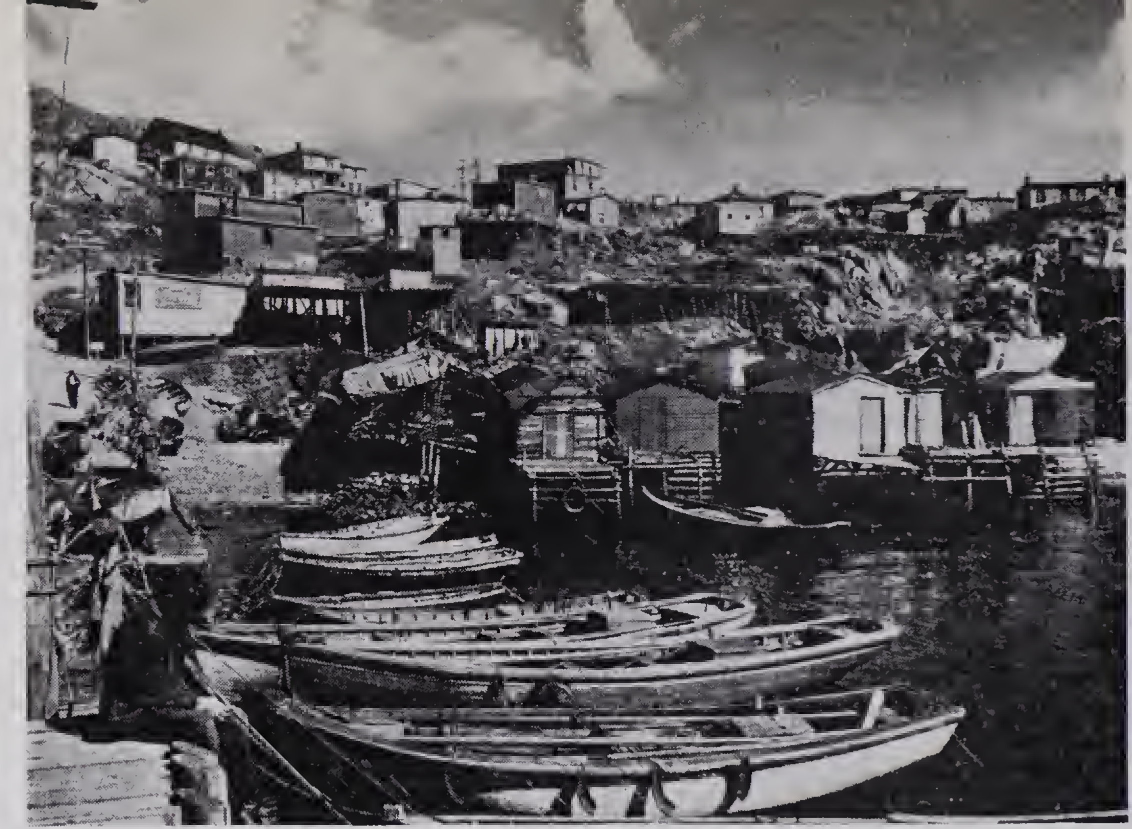
5—4 Regions of the Atlantic Provinces

"O, what of the fright, the exhaustion and cold,
The depth of my story will never be told!
And all you brave fellows gets shipwrecked on the sea,
You think of the fate of the S.S. Ethie."

Learning geography from an old sea shanty

1. In what season did the storm take place? This is the worst season for storms in Newfoundland.
2. What does the reference to "the glass" mean?
3. What was the vessel carrying? Where was it going? It was similar to many vessels that still serve the coastal villages of Newfoundland. What does this tell you about transportation facilities in these remote places?

The population map shows that the people of Newfoundland are scattered along the coasts. The interesting thing is that people still continue to live by the sea and to engage in fishing despite the fact that Newfoundland was the earliest part of Canada to be discovered. People have had more than three centuries to move away from the sea if conditions were inviting enough to do so. It is believed that Viking explorers may have stopped here about 1000 A.D. John Cabot, the Italian explorer who sailed on behalf of England, is credited with discovering and naming the island in 1497. By 1583, when it officially became an English colony, St. John's Harbor was being visited by ships from several nations. In 1610, the first colonists – 41 of them – arrived and settled in a small cove on Conception Bay. The English fishing merchants did not want settlers to come, and for many years the English kings tried to prevent colonization. However, settlers could easily hide out in remote coves, and small fishing villages grew up. After 1815, settlers were given permission to come. The hundreds of little villages that grew up were given unusual names. These names tell us something about the early settlers and the conditions they faced. We can imagine the despair of those who named Bleak Island, Misery Point, Confusion Bay, and Wreck Cove. Other settlers must have been happier, because they used such names as Heart's Desire, Safe Harbor, and Comfort Cove. Some names reveal where the settlers came from: English Harbor, Portugal Cove, Frenchman's Cove, and Ireland's Eye. Many names are French, especially on the west coast of the island. Some villages are named after animals, birds, and, of course, fish. The most unusual names include Seldom-Come-By, Blow-me-down, Run-by-guess, and Mistaken Point. An interesting question to consider is why so many small villages developed rather than many large towns or ports. Although the government is encouraging people to move to the larger centres, many prefer their traditional village life.



5—5 A Newfoundland "outport" village, Portugal Cove in Conception Bay (Canadian National Railways photo)

What can we learn, from a picture and a large-scale map, about the land and people of the Newfoundland coast?

1. Figure 5—5 shows a fishing cove and village on Conception Bay, northwest of St. John's.

(a) Locate Conception Bay in your atlas.

(b) Describe the site of the village and the arrangement of the houses.

(c) What building materials have been used in the houses?

(d) Suggest a possible reason for the name of this village.

2. There are many evidences that this is a fishing village.

(a) Note the small vessels called **dories.** Most fishing in Newfoundland is still carried on in small vessels like these.

(b) Describe the buildings that extend out over the water. What are they used for?

(c) Suggest uses of the large platforms on the shore above these buildings.

3. Give reasons why people living in Portugal Cove look to the sea rather than to the land for a living.

4. Describe the nature of the coast in this part of Newfoundland.

5. Now study the large-scale map in Figure 5—6. This area is located a few miles north of St. John's.

(a) How many square miles are shown on this map?

(b) What fraction of the coast consists of cliffs?

(c) What is the greatest height of these cliffs?

(d) Would the shoreline at Sculpins Point be steep? Explain.

6. What is the distance between Outer Cove and Sculpins Point? What change in elevation takes place between these two areas?

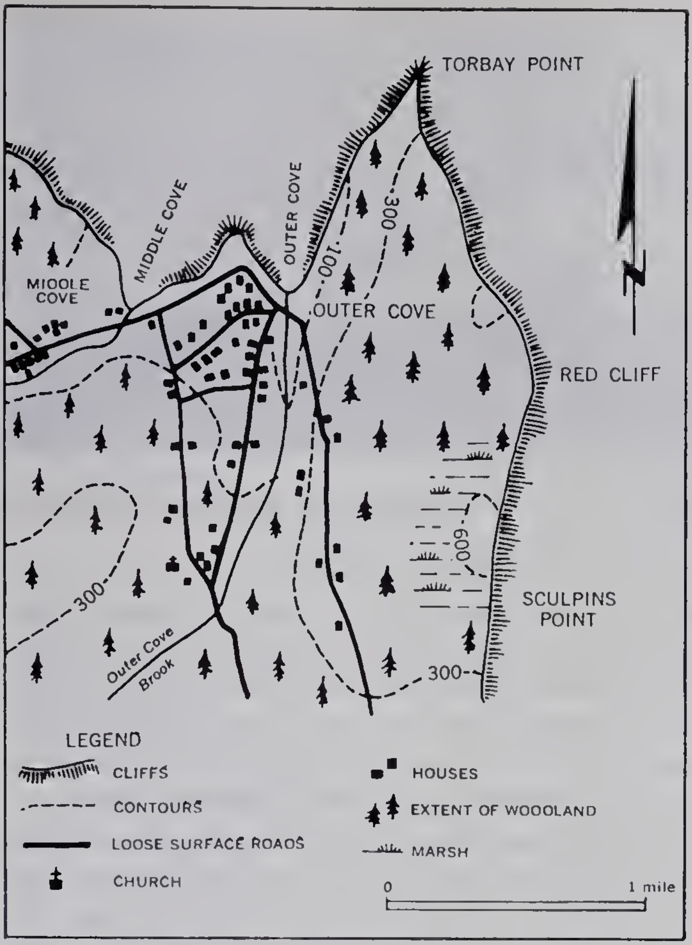
7. (a) At what elevation are most of the houses located?

(b) What reasons explain the location of the two villages on this particular part of the coast?

8. (a) How does the map help to explain why there is little farming in this area?

(b) What occupations do the people probably follow?

(c) What means of transportation do they have?



5—6 A detailed map of a small part of the Newfoundland coast, north of St. John's (after the National Topographic Series)

The villages that you have studied in the photograph and map are called *outports*. As we have seen, fishing is the main occupation of the people in these villages. There are two kinds of fishing carried on off the coasts of the Atlantic Provinces. These include *inshore* and *deep-sea* fishing. Inshore fishing accounts for most of the catch. It is usually carried on within six miles of shore during the short season that lasts from June until October. From such villages as the one we studied in Figure 5-5, fishermen set out in their small dories. These vessels are 15 to 20 feet long, each equipped with a motor, a compass, an anchor, and fishing gear. Two men usually work together in such a boat. Their main catch is cod, which is one of the several *ground fish* that are caught along the coast. These fish are called ground fish because they feed on and stay near the ocean floor.

Various methods of fishing are used. One method is called trawling. Each dory has one or more trawls. A trawl is a long line with as many as 500 shorter lines (each about three feet long), attached to it. Each short line or *ganging* has a hook which was baited the night before. Frozen herring, caplin, or squid are used as bait. Many Newfoundland fishermen still use a *squid-jig*. This device and the catching of squid for bait have been described very well by Rudyard

5—7 A "long-liner" also equipped for seining (Canadian Department of Fisheries photo)

Kipling in his famous story of the Newfoundland fisheries entitled *Captains Courageous*. Part of his description follows:*

> "They were waked out of their bunks one black night by yells of 'Squid O' from Salters, and for an hour and a half every soul aboard hung over his squid-jig—a piece of lead painted red and armed at the lower end with a circle of pins bent backward like half-opened umbrella ribs. The squid—for some unknown reason—likes and wraps himself around this thing and is hauled up ere he can escape from the pins. But as he leaves his home, he squirts first water and next ink into his captor's face; and it was curious to see the men waving their heads from side to side, to dodge the shot. They were as black as sweeps when the flurry ended; but a pile of fresh squid lay on the deck, and the large cod thinks very well of a little shiny piece of squid-tentacle at the tip of a clam-baited hook."

Figure 5-7 shows a picture of a "long-liner," often used in trawling. Such a vessel, powered by diesel engines, may weigh as much as 40 tons, carry a crew of six men, and put out 6000 hooks. In this way, as much as ten tons of fish may be landed in a single day. On a long-liner, the trawls are attached together to form the long line which can be hauled back on board the vessel by means of an "iron man." The iron man is like a wheel operated by the ship's engines. As the line is hauled in, the fish are removed and more bait is put on the empty hooks.

Inshore fishermen use nets for catching some fish, especially herring, which swim near the surface of the water. These fish swim in great "schools" which may be as much as five miles wide and eight to nine miles long. In winter, men fish for them through the ice. Figure 5-8 shows a gill-net being set. One end is attached to a floating buoy. As the boat moves away from the buoy, the head rope on the top is paid out. How is the head rope able to float? Lead sinkers hang along the bottom rope. The whole net may be three or four hundred feet long and four to six feet deep. It looks very much like a tennis net.

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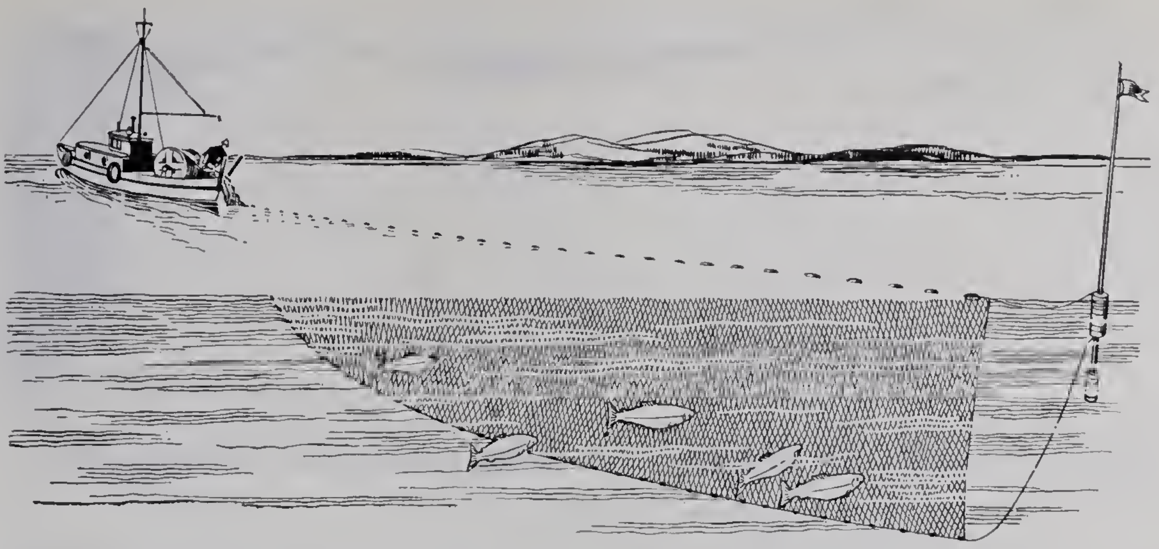
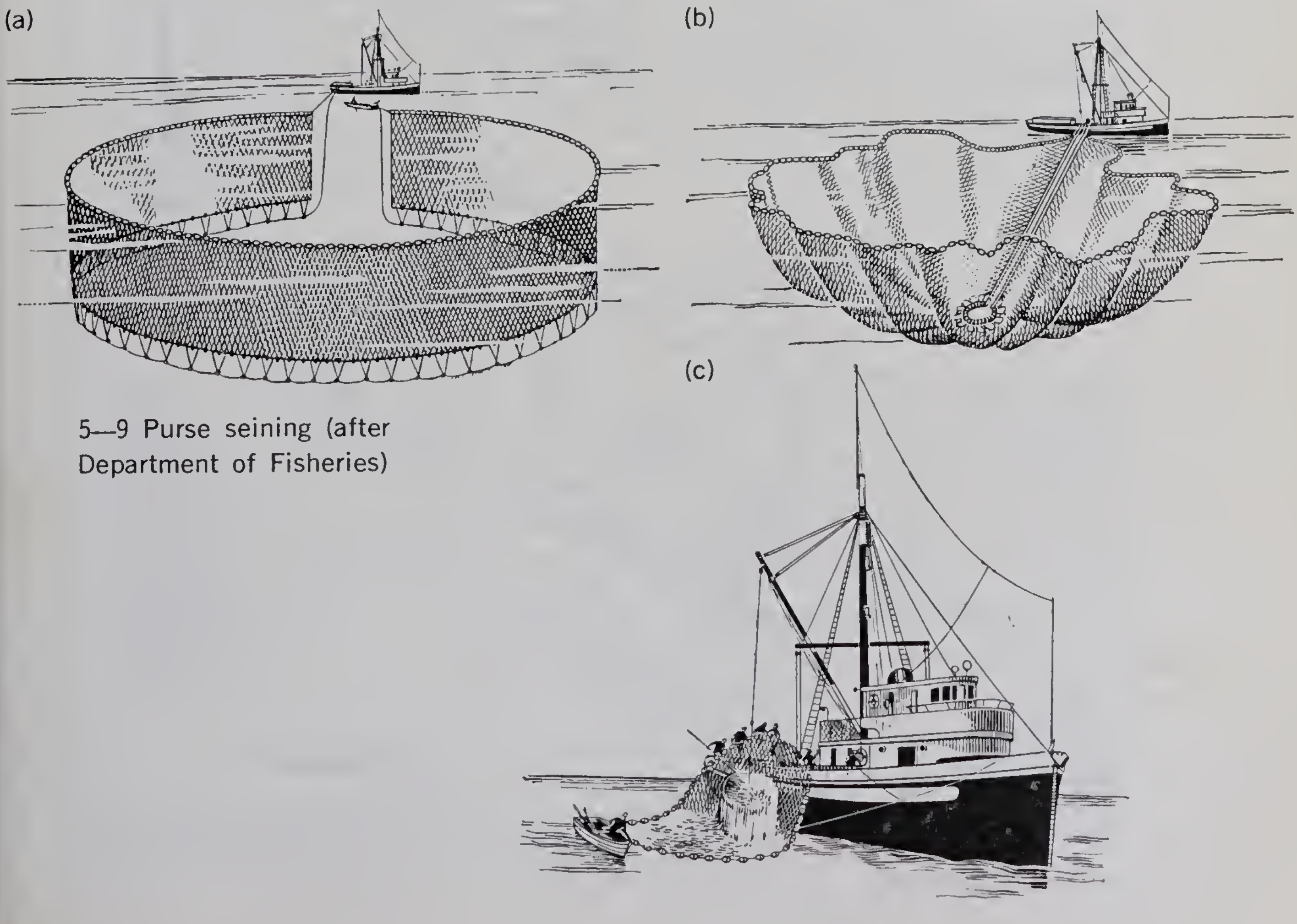
*Material in this chapter from Kipling's *Captains Courageous* is used by permission of Mrs. George Bambridge and the Macmillan Publishing Company Ltd., Toronto, Ont.



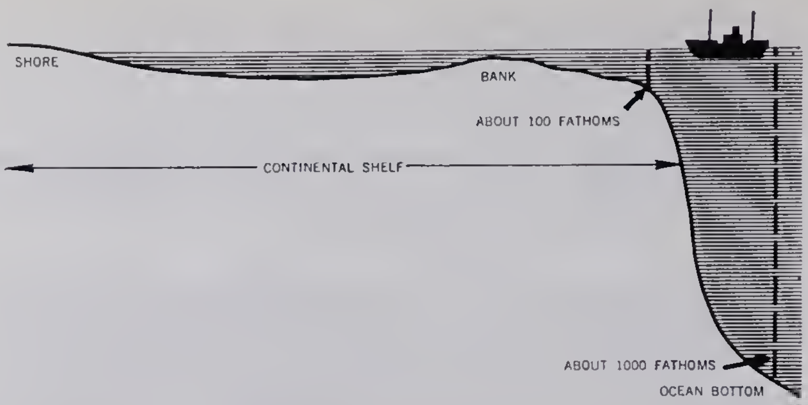
5—8 Setting a gill net (after Department of Fisheries)

When the herring swim into it, their gills become caught in the meshes of the net.

Figure 5-9 illustrates another method of catching fish, especially herring. This is called purse seining. Here, two boats are used. Notice that the purse seine looks very much like a gill net. In the picture, notice how the small dory is bringing its end of the net back to the larger vessel. A draw string at the bottom of the net pulls it tight, closing the bottom of the net and preventing the fish from escaping.



5—9 Purse seining (after Department of Fisheries)



5—10 Diagram of the continental shelf (after C. Dunphy)

Fishing methods, the "Banks," and ocean currents off Newfoundland

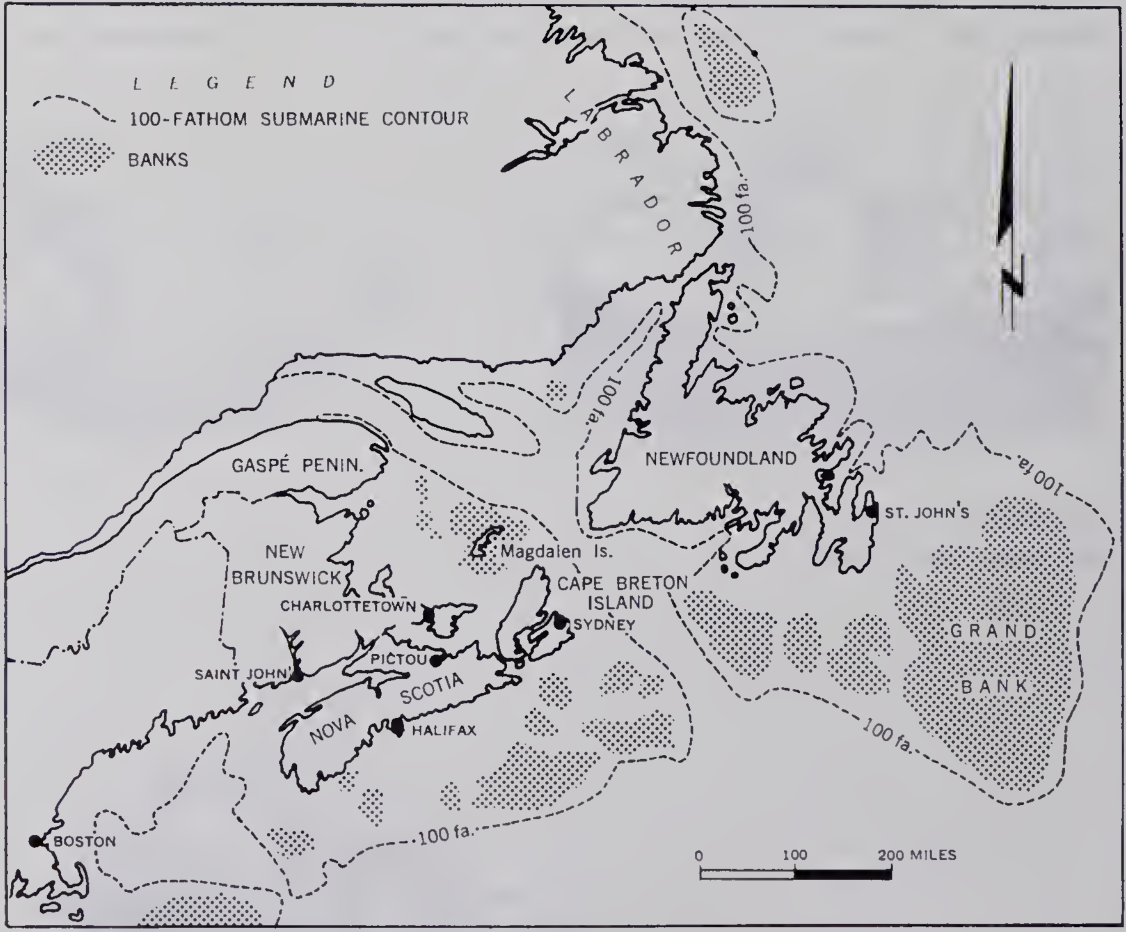
1. What is meant by inshore fishing?

2. Explain the meaning of these terms: ground fish; dory; trawling; long-liner.

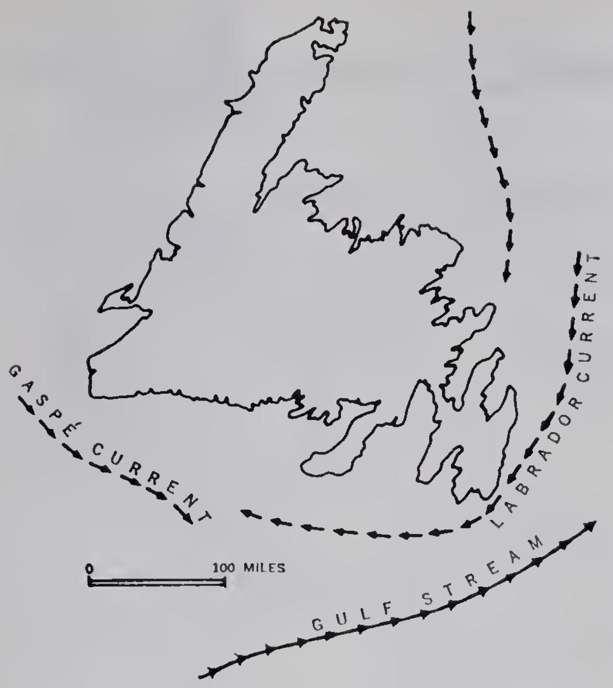
3. Why is gill-netting a good name for this kind of fishing? How is a purse seine different from a gill net?

4. Deep-sea fishing takes place on the "banks" that surround Newfoundland and the other Atlantic Provinces. Figure 5—10 may help you to understand how these banks were formed. Scientists believe that much of the land off the coast of Newfoundland was once above water and formed part of the island.

(a) What is this submerged land called, according to Figure 5—10? Locate a bank in the diagram. Notice that it is even more shallow than the rest of the continental shelf.



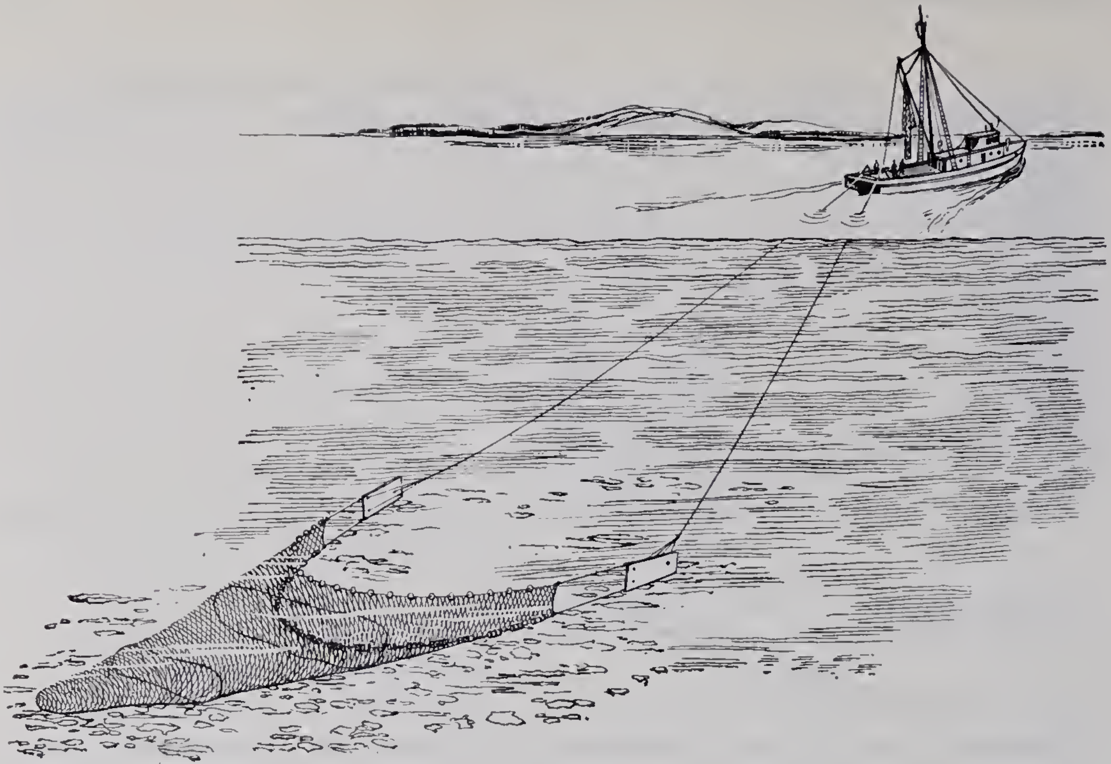
5—11 The fishing banks of North America's Atlantic coast from Cape Cod to Labrador (after J. B. Brebner)



5—12 Marine circulation around the Newfoundland coast

(b) Now study Figure 5—11. Find the famous Grand Bank. Use the scale of the map to find out how far the eastern edge of this bank is from the nearest coast of Newfoundland. Compare the size of the Grand Bank with the island of Newfoundland.
(c) How many banks lie off the south coast? Beyond the banks, the sea bottom drops steeply to the deep ocean depths. A fathom is equal to six feet.
(d) What is the maximum depth of the continental shelf, according to the diagram?
(e) What is the depth of the ocean beyond the edge of the shelf?
5. Figure 5—12 shows where two famous ocean currents meet off the southeast coast of Newfoundland, in the shallow waters of the continental shelf. Name these currents. The mixing of these warm and cold waters provides the temperature and saltiness of the water in which tiny, microscopic creatures called **plankton** thrive. The cod and other fish feed on the plankton and similar tiny organisms and small sea creatures.

Deep-sea fishermen use the same methods as those used in the inshore fisheries. Long-lines and nets are employed. The fishermen go out to the banks for several days or weeks at a time. Until recently, schooners were widely used. Each carried small dories from which fishing was done by nets or lines, as already described. Nowadays, they have been replaced by long-liners, trawlers, and draggers. A trawler may be as much as 200 feet long and is made of steel. A dragger is a somewhat smaller vessel, usually less than 100 feet long and made of steel or wood. "Dragging" or otter trawling is often used on these vessels instead of the older methods of trawling or long-lining. A huge bag-shaped net is dragged along the ocean floor. Study Figure 5-13, which shows an otter trawler at work. The fish will be hauled aboard and sorted into pens on the deck. They are then cleaned and stored in ice in the holds. Vessels such as trawlers are equipped with telephone, radios, sounders, and, often, with radar.

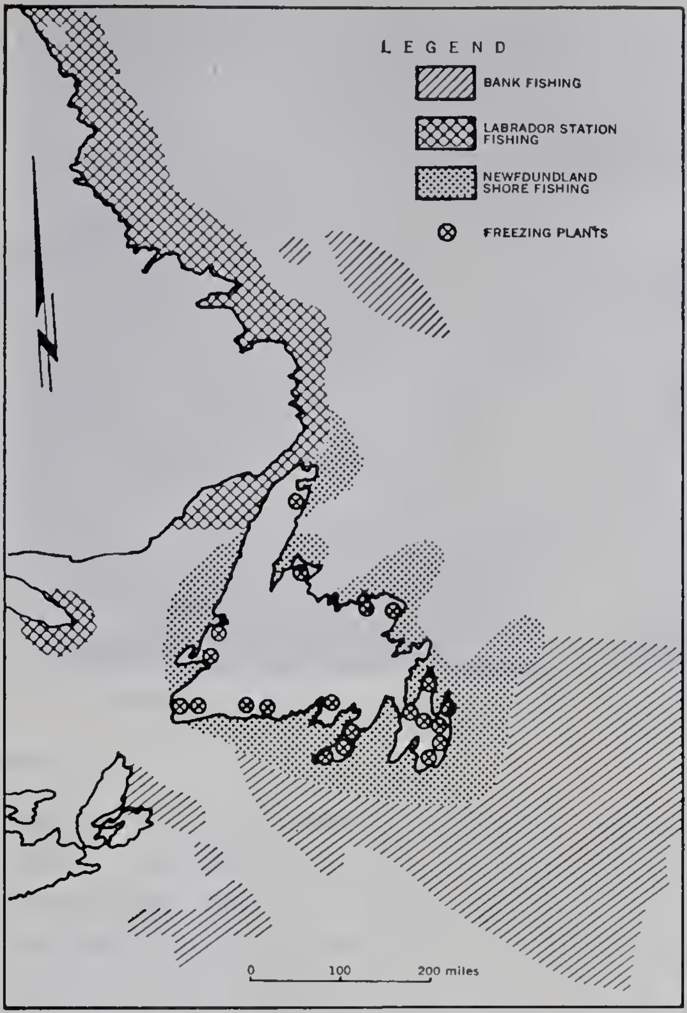


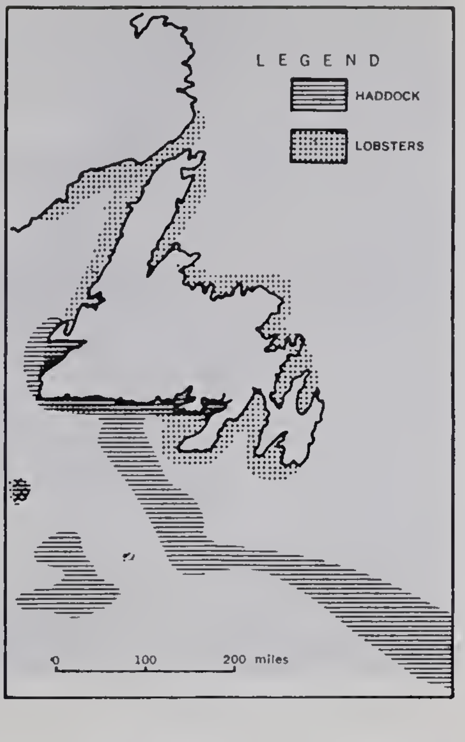
5—13 An otter trawler (after Department of Fisheries)

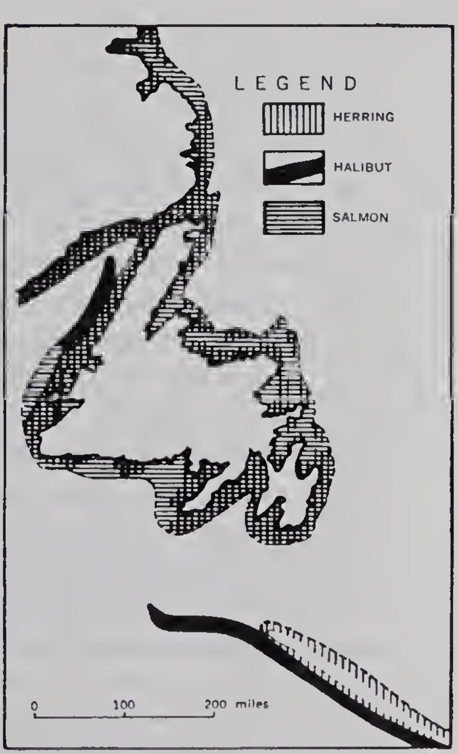
By means of a sounder, the captain can find out the depth of the water, or can tell whether there are many fish in the waters beneath him. Radar enables him to "see" another boat, or an iceberg, in a dense fog.

Methods of handling or processing fish have changed a great deal in recent years. Formerly, after the fish were cleaned and split open, they were salted, washed, and set out to dry on wooden platforms called "flakes." This method is still used to preserve fish for export, especially from Newfoundland to the West Indies. Nowadays, fish are often washed in electric washers and dried indoors. Machines have even been designed that will clean and skin the fish. Chemicals have replaced salt as a preservative. Freezing has also become an important method of preservation. Study Figure 5-14. How many fish-freezing plants are shown in Newfoundland? Ships now have refrigerated holds, and refrigerated railway cars carry fish. Expensive delicacies, such as lobster, are packed in ice and shipped by airplane. A family in Toronto may now have for dinner a fish that was swimming off the coast of Newfoundland only three days before.

The Newfoundland fishing industry has always faced many problems. For centuries, fishermen have lived in hundreds of tiny, scattered villages, depending mainly on the cod. With nearly half the catch made up of this fish, which is still one of the two or three most important exports of Newfoundland, fishermen were too dependent on a single product. Why is dependence on a single product for a living usually rather dangerous? In recent years, more and more







5—14 The fisheries of Newfoundland (after the **Atlas of Canada**)

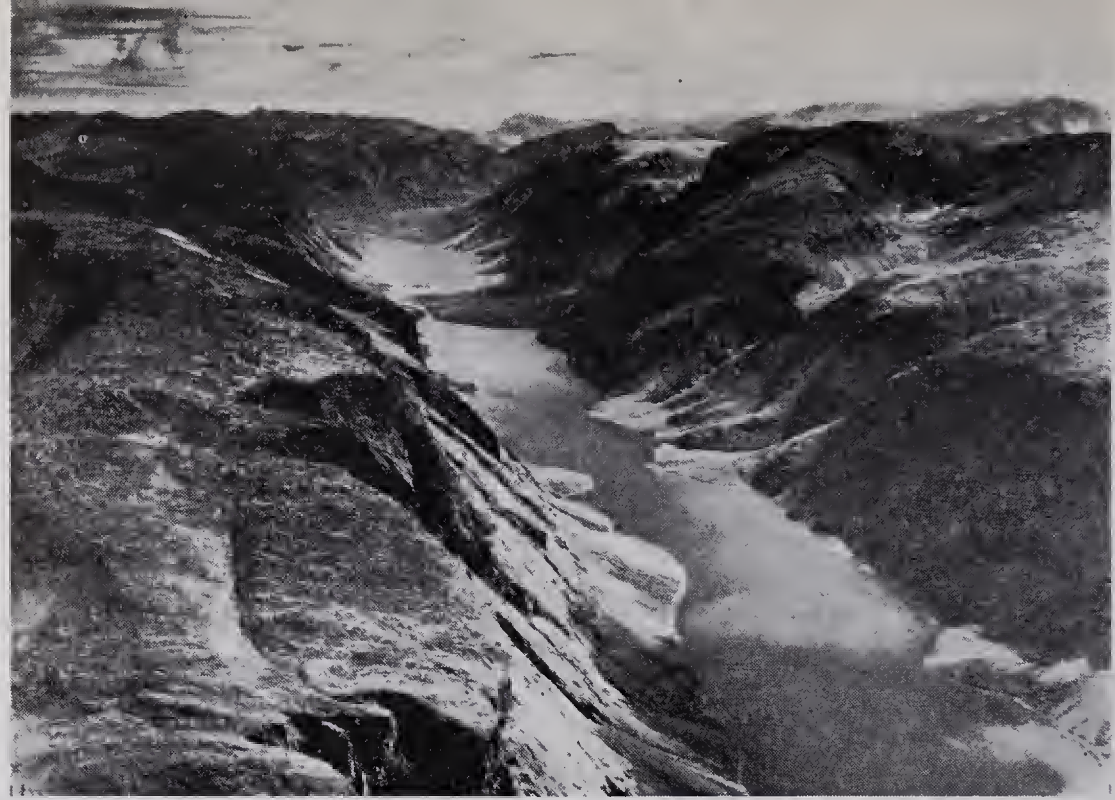
Above, the cod fisheries.

Top right, haddock and lobster fisheries

Bottom right, herring, halibut, and salmon fisheries

European fishing fleets have been appearing on the banks, and exports to that continent have fallen.

The Newfoundland Government has been very anxious to help fishermen to enjoy better living conditions. Many have been encouraged to move from the smaller villages into larger centres where schools, hospitals, and other services are available to them. Why would such services be hard to provide in small settlements such as those shown in Figures 5-5 and 5-6? Fishermen have been encouraged to hunt for different varieties of fish. In this way, they are less dependent on the cod.



5—15 Part of the fjorded coast of Labrador (General Survey of Canada photo)

Fishing in Newfoundland

1. (a) Name six types of fish caught off the coast of Newfoundland, according to Figure 5—14.

(b) Name three types caught off the coast of Labrador. Less than 3000 people, many of them Eskimos and Indians, live along this lonely coast. The fishermen here are called "livyeres" or "live heres." Other fishermen come from Newfoundland to fish along the shore during the summer months. Much of this coast consists of lonely **fjords**.

(c) Describe a fjord, as it appears in Figure 5—15. Such inlets are usually very deep. The coast of Labrador was weighed down by the great pressure of the ice many thousands of years ago. After the ice disappeared, having first worn out a great trench, the sea was able to move in.

2. Although seals are not fish, hunting for them on the ice floes off the coast of Newfoundland may be thought of as part of the fishing industry. St. John's is the headquarters of the sealing fleet. By March or April of each year, thousands of seals and their young have been carried on ice floes from the cold ocean waters between Newfoundland and Greenland. Study Figure 5—12. Which ocean current carries the floes, and the seals, southward? Hunting seals is an exciting and dangerous business. Nowadays, large diesel-powered ships, often equipped with helicopters for locating the herds of seals from the air, are used in the annual hunt. The governments of Canada, Norway, and the United States have joined together in recent years to save the seal population. So many were being killed each year that there was a real danger of their extinction. In what ways is the seal of value to man?

3. Today, about 15,000 men are employed in the fishing industry of Newfoundland. This is about half as many as were employed 30 years ago. However, they catch many more fish. What have you learned in this chapter that might help to explain this fact? About 3000 men and women are employed in processing fish. Altogether, directly or indirectly, fishing still employs more people in Newfoundland than does any other occupation.

4. The following table gives certain information about Canada's five most important fishing provinces:

Province	Persons employed in the primary fishing industry, 1959	Quantity of fish landed, 1959	Value of all products of the fisheries, 1959
		'000 lbs.	$ '000
Newfoundland	18,430	562,228	31,675
Nova Scotia	13,012	423,273	50,367
New Brunswick	6,382	227,994	28,367
Quebec	6,424	112,954	7,856
British Columbia	15,456	613,597	67,067

(a) How does Newfoundland rank among the provinces in the number of people employed in fishing?

(b) How does the province rank among the Atlantic Provinces in quantity of fish landed?

(c) Try to explain the fact that, although Newfoundland lands nearly as much fish in a year as British Columbia, and much more than Nova Scotia, the **value** of its fish products is much less than in those provinces. One clue to the answer may be the **kind** and **market price** of the chief fish caught in the three provinces.

Climate

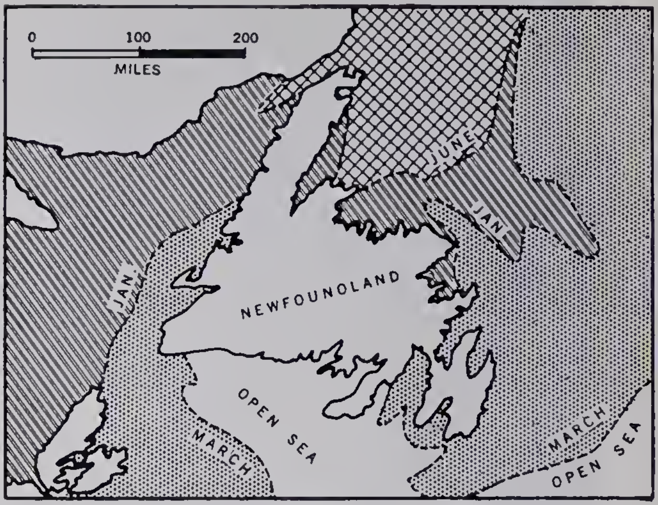
In our study of fishing, we noticed that this industry is most active during the summer months. The map in Figure 5-16 will help explain why. During which month is Newfoundland almost surrounded by ice? Study the map of ocean currents again in Figure 5-12. The mixing of the cold and warm air above the Labrador Current and the Gulf Stream is the chief cause of the famous Newfoundland fogs. The worst fogs occur off the coast, on the Banks. St. John's records only 37 foggy days in an average year. July is the worst month along the southeastern coasts. Cape Race once recorded 193 consecutive hours of fog in that month. The following description of a Grand Banks fog will help you to appreciate what one is like. This description is from Kipling's *Captains Courageous.* It tells of the experience of a boy, Harvey Cheyne, who worked on a schooner on the banks nearly 50 years ago:

> "And yet, half an hour later, as they were dressing down, the Bank fog dripped on them. . . . It drove steadily and in wreaths, curling and smoking along the colorless water. . . . For days they worked in fog—Harvey at the bell—till, grown familiar with the thick airs, he went out with Tom Platts, his heart rather in his mouth. But the fog would not lift and the fish were biting, and no one can be helplessly afraid for six hours at a time. . . . But it was an unearthly experience and, for the first time in a month, Harvey dreamed of the shifting, smoking floors of water round the dory, the lines that strayed into nothing, and the air above that melted on the sea below, ten feet from his straining eyes."

The climate of Newfoundland

1. How do you know from this passage that fog sometimes comes suddenly to the banks?
2. In what ways does it resemble smoke?

5—16 Distribution of sea-ice off Newfoundland in certain months (after F. K. Hare)



3. Why did the water seem colorless?

4. Make a list of all the phrases that tell you that the fog was thick and that there was almost no visibility.

5. Where did Harvey go when he "went out"? Later in the story we are told that it was a whole week before Harvey saw the sun again. Why did he have good reason to be afraid? Why would a fog on the banks be less dangerous nowadays?

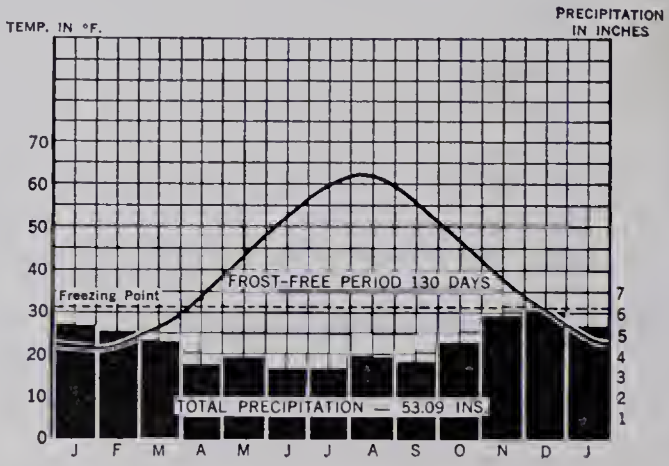
6. Study Figure 5—17, which shows a climatic graph of St. John's. The map of sea-ice in Figure 5—16 may again be useful here.

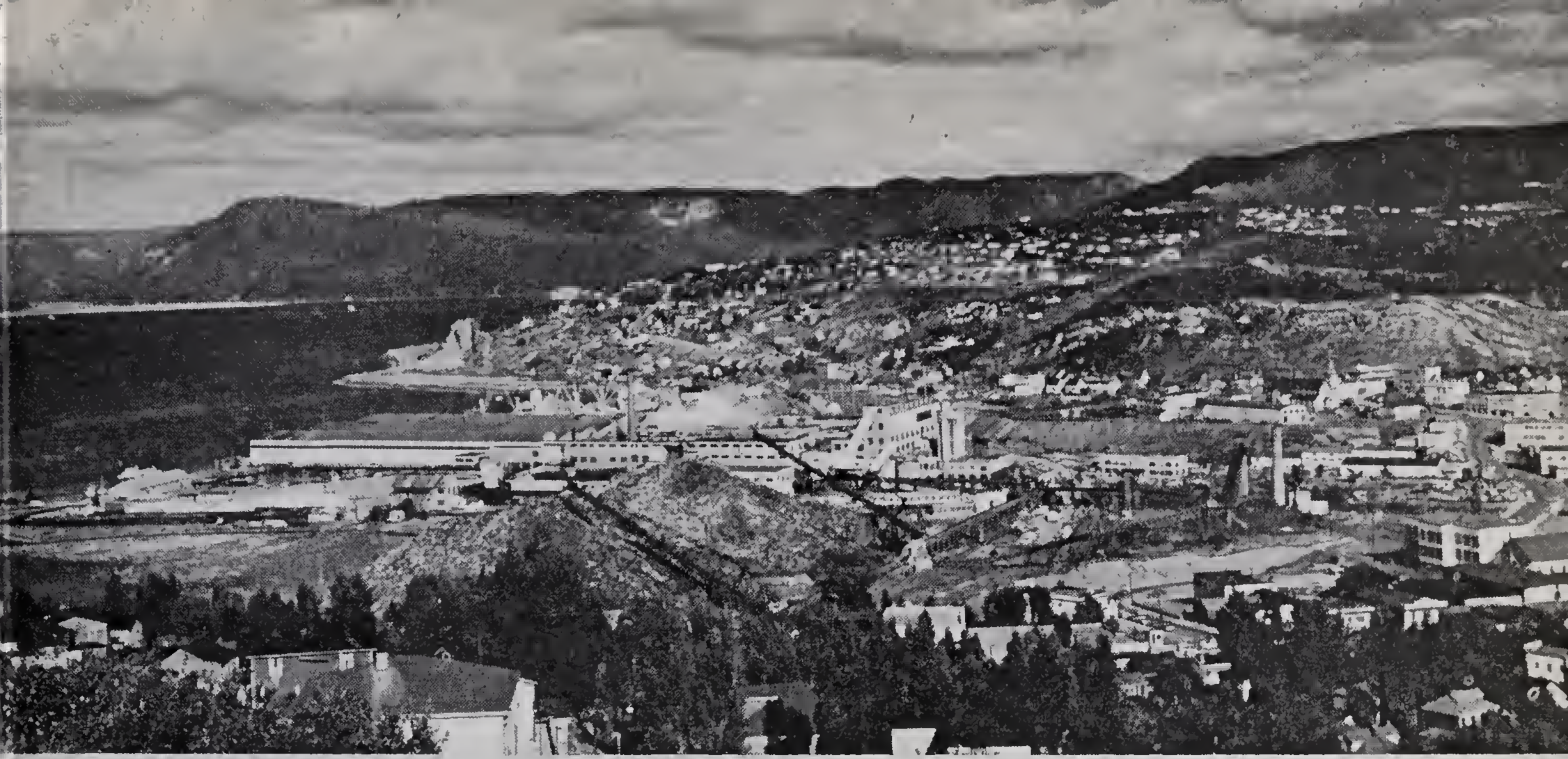
(a) What is the average temperature of St. John's in January? This is as warm as Toronto and warmer than the January average at Montreal. Now study Figure 5—16. What is the condition of the sea around St. John's in January? How does this help to explain that January at St. John's is surprisingly warm? In the interior of Newfoundland, January temperatures range from 10°F to 15°F.

(b) How warm is July at St. John's? Notice that in May and June, temperatures are quite low. How does the map of sea-ice help to explain this? At this season, many icebergs may be seen off the coast. In the interior of the island, July temperatures average above 60°F. At noon, on a warm July day, the temperature may reach 90°F. in the shade. The frost-free season in the interior is about 110 days. Around St. John's, it is about 140 days.

(c) How much precipitation does St. John's receive in an average year? Of this, about 114 inches falls as snow. Some places on the west coast may receive 200 inches of snow during the winter.

5—17 The climatic graph of St. John's, Newfoundland





5—18 A view of Corner Brook (Newfoundland Tourist Bureau photo)

7. At Belle Isle, on the north coast of Newfoundland, some interesting climatic figures are as follows:

January average	11°F.
July average	48.6°F.
Total precipitation	33 ins.
Frost-free season	97 days

Compare these figures with those for St. John's. What conclusions do you draw about the climate of northern Newfoundland compared with that for southern Newfoundland? Make a series of statements comparing the two parts of the island. In the interior of Labrador conditions are much more severe. Some places have a January average of 15°F. and a growing season of 30 days or even less.

Agriculture

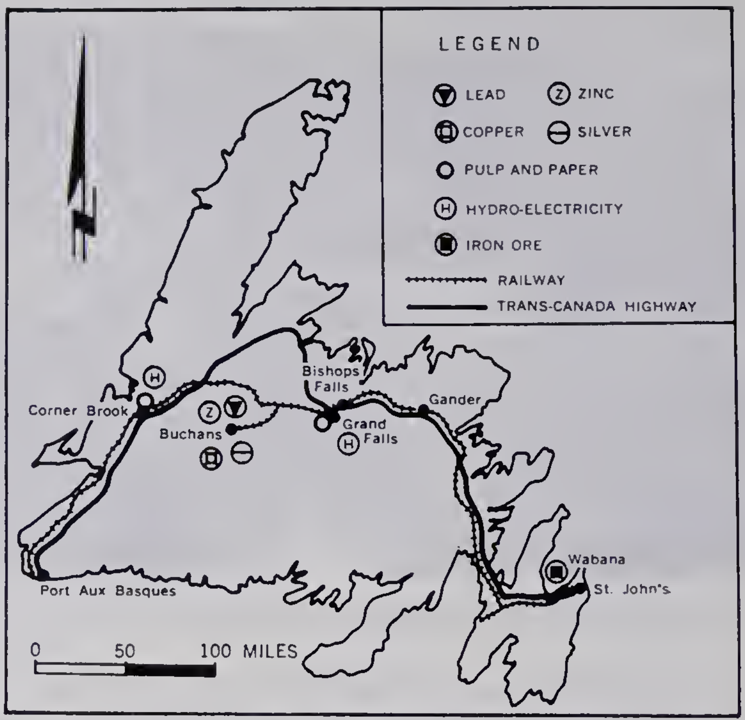
Most fishermen in Newfoundland keep small gardens around their homes. Study Figure 5-5 again. Why is farming not likely to be important in country like this? Now study Figure 5-3 again. Why is most of Newfoundland's farmland found in the Avalon Peninsula? Half the farms of the province are less than ten acres in size. Most of the land under cultivation is devoted to hay, oats, and other pasture crops. Dairying is important around St. John's and other large towns. The interior of the island consists of many bogs, swamps, and stretches of bare rock. Glaciers carried the soils away thousands of years ago. Farming is nearly impossible in country like this.

Forests and Water Power

Corner Brook — a major town of Newfoundland

1. (a) Locate Corner Brook on the map in Figure 5—4.
(b) In what general direction was the camera pointing when the picture (Figure 5—18) was taken?

5—19 The major industrial developments of Newfoundland (after the **Atlas of Canada**)



2. (a) Notice the piles of pulpwood in the foreground. Is there anything in the picture that gives a clue as to where this wood was obtained? In answering this question, study the background of the picture. In this part of Newfoundland, there are many forests of small trees that produce good pulpwood.
(b) The highest land in Newfoundland is found on the west side. Here, streams drop swiftly down to the sea. In what ways would these streams help the people to do their work and earn a living at Corner Brook?
3. Study the skyline in the far distance. With your finger, trace this skyline from the left to right across the picture. Describe the hills in the distance. Much of western Newfoundland and the interior consists of country like this.
4. (a) How do many of the people in Corner Brook probably earn a living?
(b) How are the products of the mill sent to market? These products are sold in Europe and the United States.
5.(a) Study Figure 5—19. Besides Corner Brook, name one other place in Newfoundland where hydro-electricity and pulp and paper are produced.
(b) Study Figure 5—3 and state in what direction the land slopes in this part of the island. Name the river that drains this region.

Newfoundland receives much precipitation that feeds its many lakes and streams. The rivers drop sharply down to the coasts. The lakes generally lie in hollows or rock basins that were scooped out by the glaciers. They serve as fine natural storage basins. Power was first generated at Grand Falls in 1909. The pulp and paper mill shown in Figure 5-18 was opened at Corner Brook in 1923. It is one of the largest in the world. Pulp and paper is now the chief export of Newfoundland in total value. Several thousand people are employed in the mills. Most of those employed in the woods are fishermen who work as part-time loggers during the winter months.

Mining

Name five important minerals produced on the island, according to Figure 5-19. Much of the iron ore from Wabana is sent to Sydney, in Nova Scotia, where it is made into steel. Most of the province's iron ore comes from the famous Labrador fields. These are shared with Quebec. Locate these fields on the map in Figure 4-53 (Chapter 4). Iron ore accounts for about two thirds of Newfoundland's total mineral production. Which town in the interior of the island produces the other minerals shown in Figure 5-19? Newfoundland ranks next to British Columbia as a Canadian producer of lead. It is third, ranking behind British Columbia and Quebec, as a producer of zinc.

Transportation, Manufacturing, and Cities

Newfoundland's links with the outside world

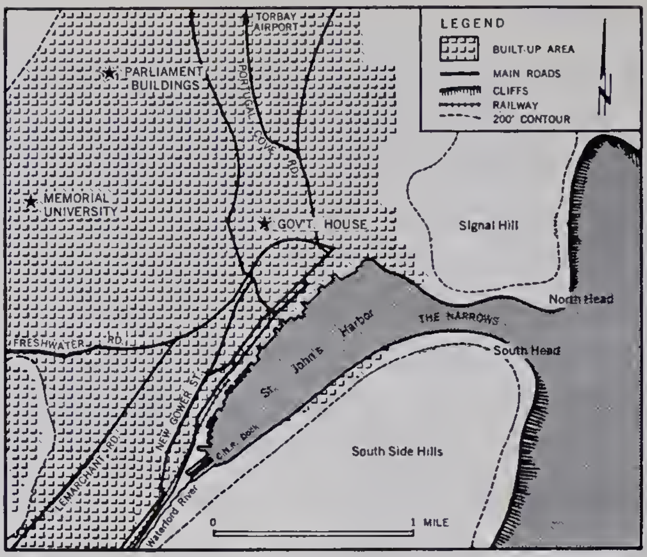
1. Describe the course of the railway shown in Figure 5—19.
2. What means of transportation is used to link coastal settlements in areas lacking roads and railways? Give reasons why settlements, especially on the north coast, are sometimes isolated for weeks at a time.
3. Why is Gander an important transportation centre?
4. Which Nova Scotia port serves as Newfoundland's main link with the other Atlantic Provinces and with the rest of Canada?
5. In this chapter so far, we have learned that many people in Newfoundland engage in fishing, farming, lumbering, and mining. Make a list of some occupations that people might engage in that use raw materials provided by these industries. You have already learned of one such occupation at Corner Brook and Grand Falls.

Nearly one sixth of the population of Newfoundland lives in the city of St. John's. In 1961, more than 90,000 people lived in the city and its suburbs. Only two other cities in the Atlantic Provinces are larger. Name these, according to Table 2b on page 487. St. John's has good claims to be the oldest white settlement in Canada. When Sir Humphrey Gilbert arrived there with four ships in 1583 to claim Newfoundland for England, he learned that European fishermen had been visiting it for many years. Like many old cities, St. John's grew up as an unplanned settlement. This is evident in the nature of the winding, old streets. Since very early times, it has been a port and fishing centre.

Why has St. John's become an important city? (Figures 5-20 and 5-21)

1. How does the map tell us right away that St. John's is a good location for a port?
2. The widest part of the harbor is shown by the line AB on the photograph. How wide is the harbor at this point? Refer to the map and the scale to answer this question.
3. Identify, by referring to the map, the features labelled C, D, and E on the

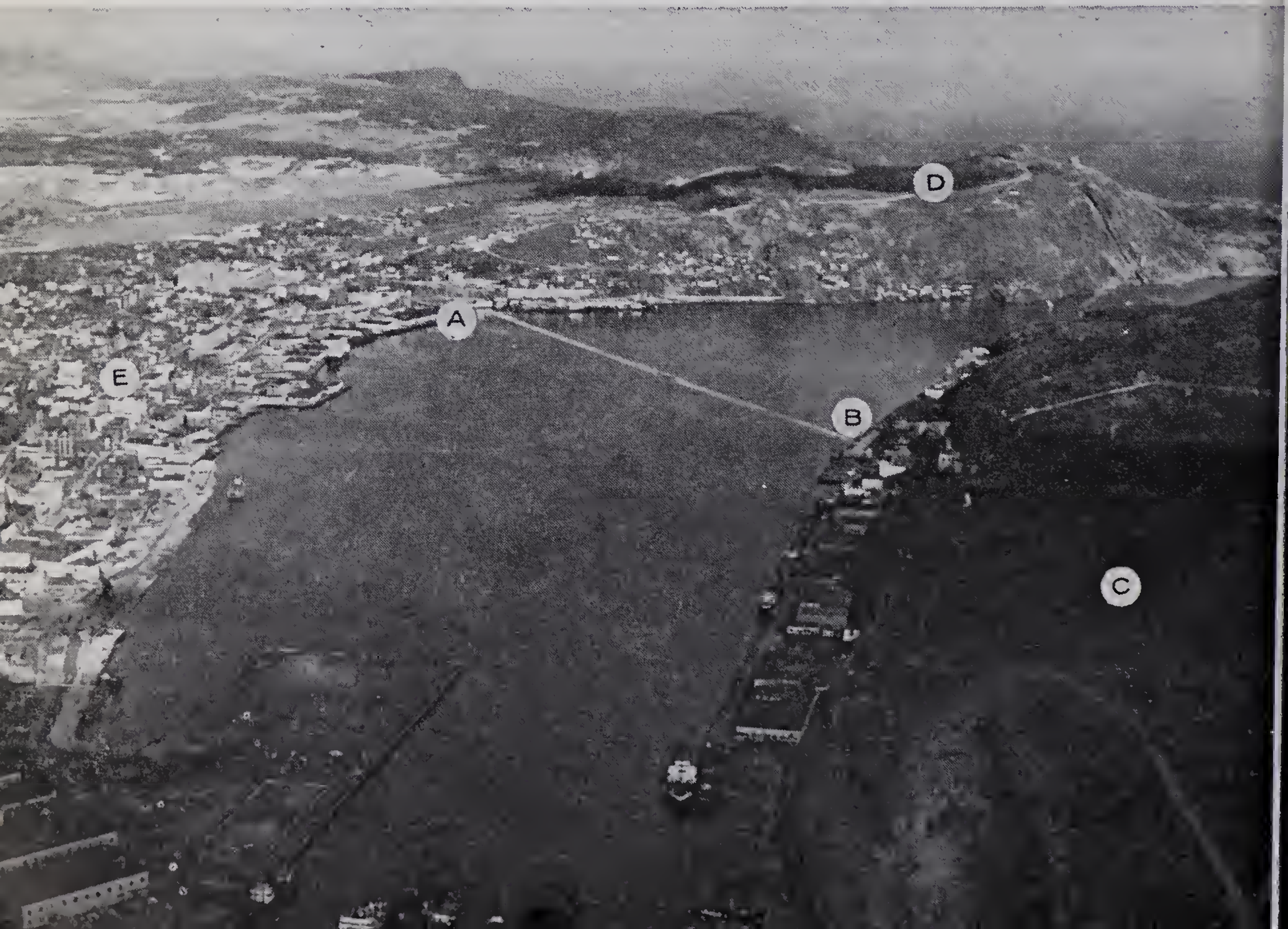
5—20 A large-scale map of St. John's



photograph. In which direction was the camera pointing when the picture was taken? As a ship sails out of the Narrows, in which direction is it heading? What is the nature of the coast north and south of the Narrows?

4. Use an atlas or globe to calculate how far St. John's is from European ports such as Bristol, Southampton, or Hamburg.
5. Name two important functions of St. John's that are shown by the map.
6. Why did the town grow up on the west side of the harbor instead of on the east side?

5—21 St. John's Harbor and vicinity (Newfoundland Tourist Bureau photo)



St. John's is an important manufacturing city. Its people engage in fish packing and processing, shipbuilding and repairing, woodworking, the making of clothing, beverages, and food products. However, it does not ship out a large proportion of Newfoundland's great exports of pulp and paper and iron ore. Suggest why this should be so. The chief imports of the city are flour, sugar, fruit, meat, coal, gasoline, and tobacco.

What have we learned about the geography of Newfoundland?

1. What important activities are connected with each of these cities: Gander; Grand Falls; Buchans; Corner Brook; Port aux Basques?
2. Four regions of Newfoundland are shown in Figure 5—4. State one important fact about each that makes it different from the other regions of the province.
3. Discuss some of the major questions that were given on pages 194-199. How do these apply to Newfoundland? Study the population map in Figure 5—2 again and try to explain the distribution in Newfoundland. Why is it a land of hardship?

PRINCE EDWARD ISLAND

Each summer, thousands of people come from many parts of Canada and the United States to visit Prince Edward Island, our smallest province. It is said that in July, the visitors outnumber the local population. In 1961, Jim Simpson and his family, who live in Ottawa, decided to spend their vacation in Prince Edward Island. Use an atlas map to trace their route via Montreal, the south shore of the St. Lawrence River to Riviere du Loup, and then down the St. John Valley of New Brunswick to Fredericton. From Fredericton, Jim's father drove the family to Cape Tormentine, where they took a ferry to Prince Edward Island. Let us follow Jim and his family on their vacation.

What did the Simpson family see in Prince Edward Island?

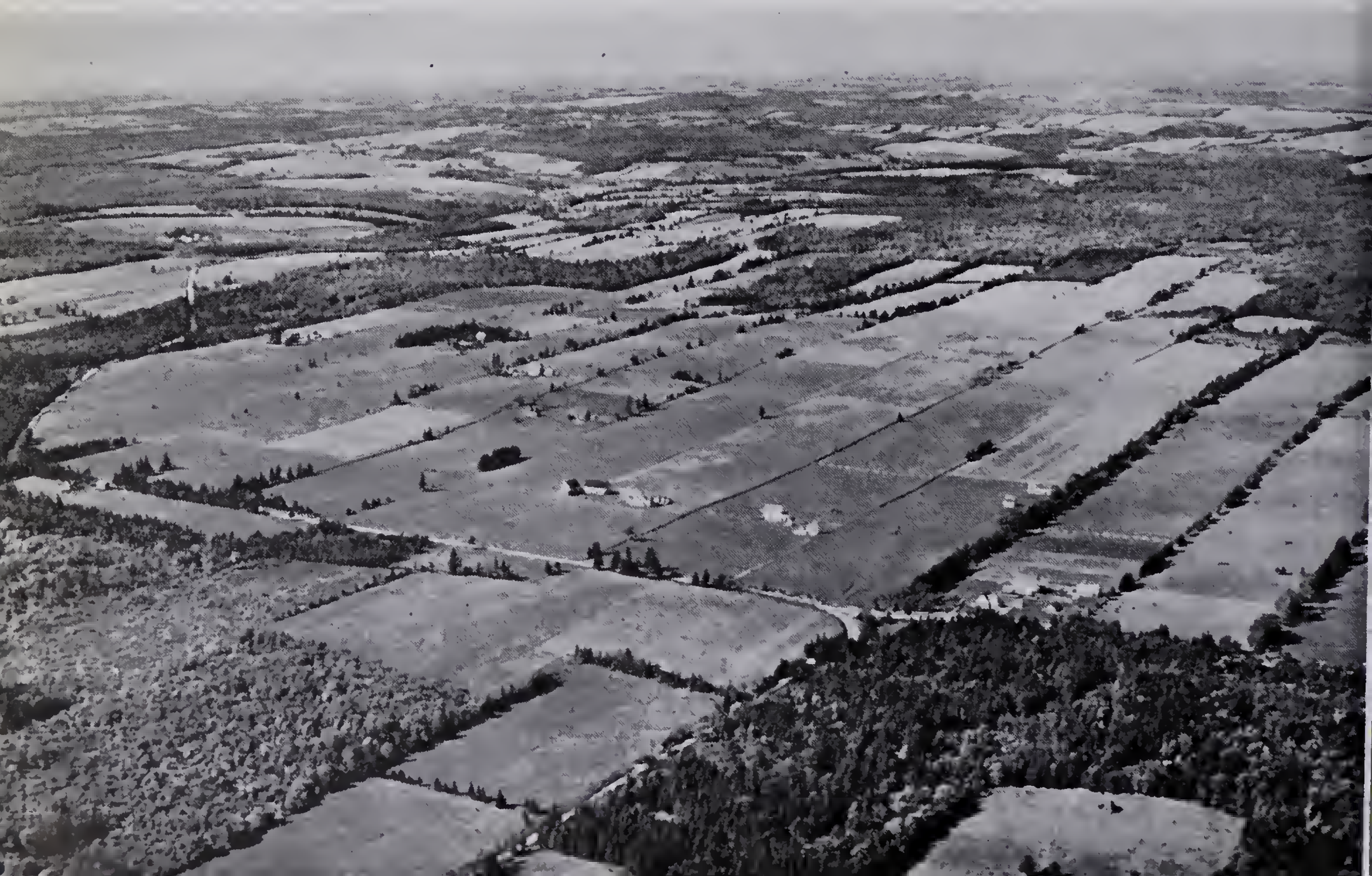
1. Check your atlas again and find out on which body of water the ferry travelled to the island. The boat that carried the Simpson family was called the "Abegweit." This is an old Indian name for Prince Edward Island and means "cradled on the waves."
2. Jim and his family stayed for two weeks at a motel near Cavendish Beach in Prince Edward Island National Park.
(a) Locate this park in Figure 5—4.
(b) Jim went swimming every day on the beach shown in Figure 5—22. How can you tell that this picture was taken in the summertime? How does the picture help to explain why Prince Edward Island is so popular with visitors? Refer to the map again and find out what body of water Jim went swimming in. In what general direction was the camera pointing when the picture was taken?
3. People like the Simpson family bring thousands of valuable tourist dollars to Prince Edward Island every year. Visitors enjoy not only the fine beaches, but

5—22 Cavendish Beach in Prince Edward Island National Park (Canadian Government Travel Bureau photo)

also the beautiful island scenery and the pleasant climate. Jacques Cartier, the famous French explorer, wrote of Prince Edward Island in 1534 in these words: "All this land is low and the most beautiful it is possible to see, full of trees and meadows." Figure 5—23 gives a view of this land that Cartier thought was so beautiful. Why did he describe this countryside as low? Tell of some ways in which this scene has changed since Cartier's time.

4. The Simpson family travelled through much country like that shown in Figure 5—23. One day, they visited a farm that raises some of Prince Edward Island's famous potatoes. They saw fields much like the one shown in Figure 5—24. Although Prince Edward Island is low in elevation, with no place as high as 500 feet, the land is not flat. Much of it is called "rolling."

5—23 Prince Edward Island Lowland (National Film Board photo)



5—24 Potato fields in Prince Edward Island

(a) Why is this a good word to describe the countryside shown in Figure 5—24?
(b) How are many of the fields separated in both this picture and in Figure 5—23?
(c) What kinds of trees seem to be growing in both pictures?
(d) How many farms can you count in the centre of Figure 5—23?
(e) Prince Edward Island has been called "The Garden Province" and "The Million-Acre Farm." How do the pictures suggest that these may be good words to describe the province?

On his visit to the potato farm, Jim learned that Prince Edward Island produces Canada's finest potatoes. Growing potatoes takes much care and hard work. The farmer whom the Simpsons visited has only 7 acres out of 110 devoted to potatoes. However, these acres require more work and produce more income than any other on the farm. Potatoes require 120 frost-free days to mature. They can be grown in nearly every part of the island. What does this fact tell you about Prince Edward Island's climate compared with most of Newfoundland? Most potato production consists of seed potatoes which are sold in all Canadian provinces, in 30 American states, and in a dozen countries. Potatoes are the chief cash crop of the province. Prince Edward Island's soils are not especially fertile and much fertilizer has been required to guarantee high yields. Better farming methods have made it possible to increase production. This is shown in the following figures, comparing potato production in 1920 and 1954:

	1920	*1954*
Total acreage in potatoes	36,000	40,500
Output in bushels	4,528,000	10,125,000
Bushels per acre	125	250

Hay is the most valuable crop of Prince Edward Island after potatoes. One fifth of the farmland is used to grow this crop. Hay supports the fine dairy herds that produce fine quality butter and cheese. There are 125,000 cattle which outnumber the human population. Hog and poultry raising are the other important activities. No other province earns so much of its living from farming.

	1881	1911	1931	1951
Total land area	1,397,760 acres	1,397,760 acres	1,397,760 acres	1,397,760 acres
Area in farms	1,126,653 "	1,202,354 "	1,191,202 "	1,095,304 "
Improved land	596,731 "	769,140 "	765,772 "	645,795 "
Under crops	451,468 "	489,944 "	497,114 "	426,210 "
Size of farm (Average)	82.7 "	85.2 "	92.6 "	108.1 "
Total number of farms	13,269	14,113	12,865	10,137

5—25 Land use in Prince Edward Island in certain census years, 1881 to 1951 inclusive.

How has the land of Prince Edward Island been used since 1880?

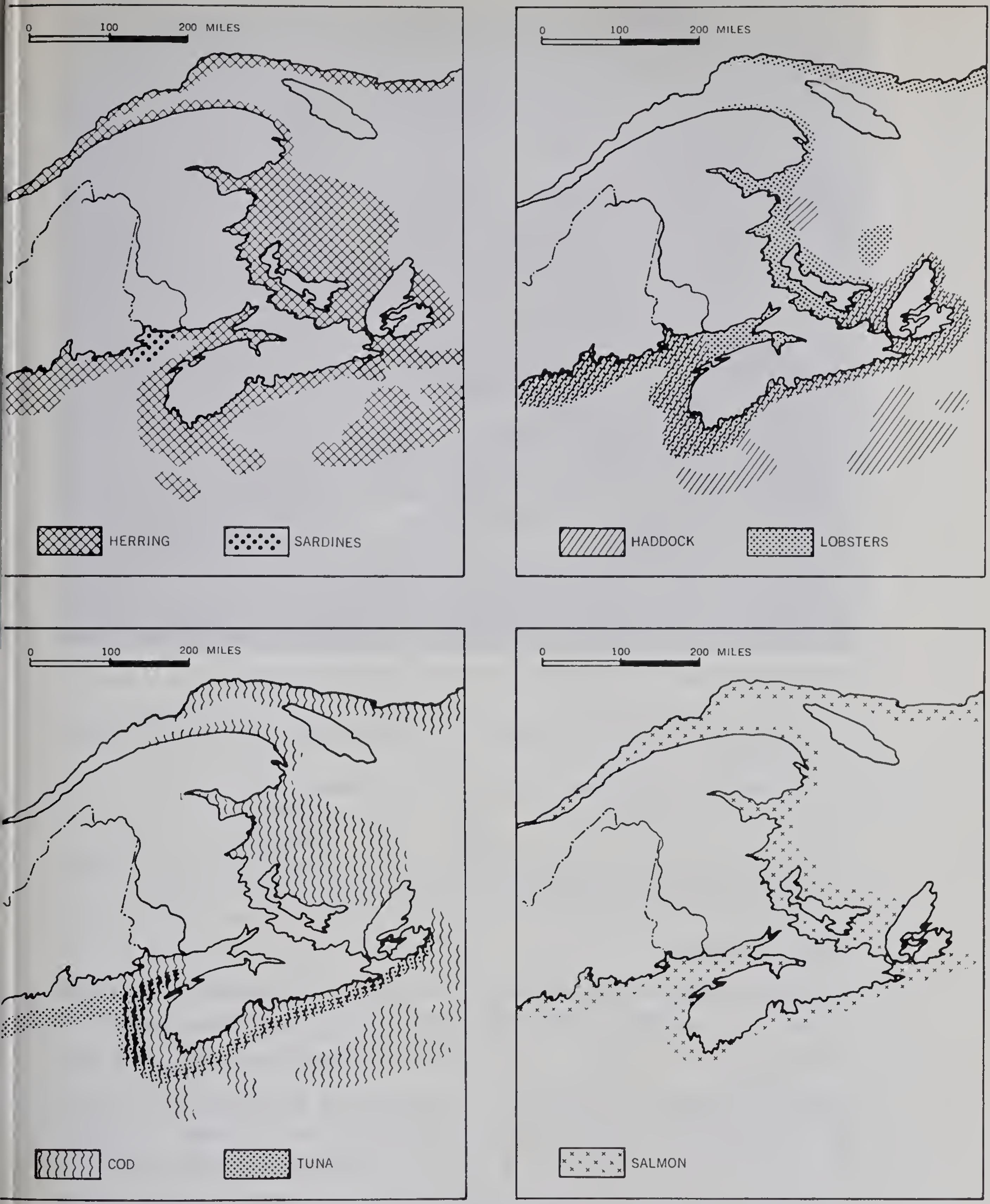
1. In which year did the province have the largest area in farms? What percentage or fraction of its total area was in farms in 1951? No other province has such a large fraction of its land in farms.
2. How did the size of the average farm change during the period 1881 to 1951?
3. What change took place in the total number of farms?
4. Although Prince Edward Island has less land under cultivation than it used to have, and fewer farmers, it produces more than ever before. Try to explain this. Name the two principal crops. How else do the province's farmers earn their income?

Fishing is the only other important industry of the province besides farming and tourism. Many farmers are part-time fishermen. Study the map in Figure 5-26 and name the chief catches made by island fishermen. Of the shellfish, lobsters are the most famous. Study pages 229-230 for a description of how the lobster fishery is conducted.

Look back at the population map in Figure 5-2. Earlier, you learned that Prince Edward Island is the only Atlantic province where the people are spread out fairly evenly across the whole province. Why do you think that this is so? With 46 people to the square mile, Prince Edward Island is also the most densely populated province. However, it also has fewer people than any other.

The site and functions of Charlottetown (Figure 5-27)

1. Refer to an atlas map and to the photograph and give some reasons why Charlottetown is the most important city of Prince Edward Island.



5—26 The fisheries of the Maritime Provinces

2. Find a bridge in the photograph. This spans the Hillsborough River. The city faces Hillsborough Bay. Use your atlas to find how far Charlottetown is from the mainland of Nova Scotia. The Federal Government has promised some day to build a causeway to connect the two provinces. How will this help Charlottetown and Prince Edward Island?

3. How does the picture indicate that Charlottetown is quite a well planned city? Find some residential areas. Why would they be pleasant areas to live in?

4. From your reading of this chapter, list some industries that you would expect

5—27 An aerial view of Charlottetown (National Film Board photo)

to find in Charlottetown. How does it compare in size with the capital of your province?

5. Study these population Figures for Prince Edward Island:

1881	1961
109,078	104,629

From your studies, suggest why Prince Edward Island is the only Canadian province that has lost population over the past 80 years.

NOVA SCOTIA

A few years ago, a film entitled "Mutiny on the Bounty" was made on the island of Tahiti in the Pacific Ocean. The beautiful eighteenth-century-type ship "Bounty" was made at Lunenburg, in Nova Scotia, nearly 7000 miles from Tahiti. Men have been building vessels along the coast of Nova Scotia for more than 200 years. Figure 5-2 shows that they still do so. That is why Metro-Goldwyn-Mayer producers, when they wanted a modern version of H.M.S. "Bounty," turned to the skilled craftsmen of Lunenburg. This is the home of the famous Bluenose schooners that once sailed the seven seas and made Nova Scotia, in 1850, the fourth largest maritime power of the world, in total ship tonnage. Fishing, farming, lumbering, shipbuilding, and trade were all closely connected in those days. It was said that the Bluenose farmer took part in all these activities, "raising the potatoes for his cargo, felling and sawing the lumber to build his own schooner in his spare moments, and finally sending her down to the West

Indies where he turned merchant and disposed of his wares." When wooden sailing ships were replaced by steel-clad steamships, Nova Scotia lost her position as a major maritime power.

One of the first white men to describe early Nova Scotia was a French missionary named Biard. In 1616, he wrote:

> "I have said before that the whole country is simply an interminable forest; for there are no open places except upon the margins of the sea, lakes, and rivers, and where meadows have been made by the overflows of the sea and rivers; there are many such places which are very beautiful, immense fields of grass and pasture like those near (Chignecto) Bay. . . ."

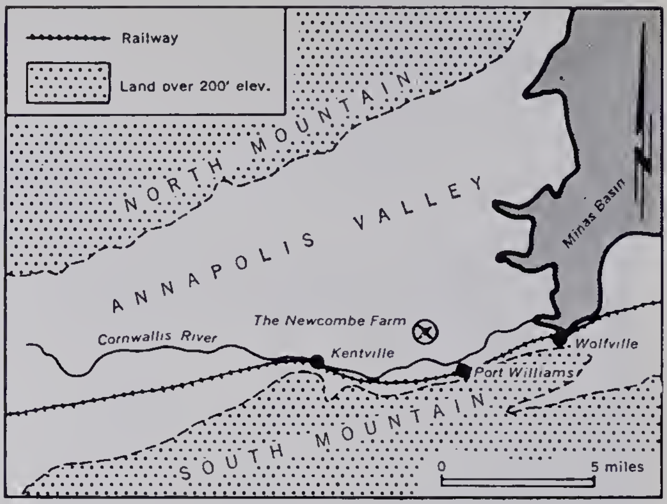
Locate Chignecto Bay on an atlas. The land Biard described was part of the famous Annapolis Valley that we shall study in this section. Earlier, at Port Royal in 1605, Champlain had established the first French settlement in Canada. The marshlands of this area were very fertile and such crops as grass, wheat, rye, corn, oats, root crops, peas, cabbages, apples, flax, and hemp were raised. Pigs, sheep, and cattle were also kept. Much later, on Cape Breton Island, the French built the great fortress of Louisbourg. Historic sites such as this are one of the reasons that Nova Scotia has a thriving tourist industry. By 1763, all of Nova Scotia was in British hands. The British had, in fact, laid claim to it as early as 1621 when, as "New Scotland," it had become part of the kingdom of James I. They had ruled the mainland since 1713. By 1786, several thousand people lived in Nova Scotia. These included, in addition to people of French and Scottish origin, many other people from England, Ireland, Germany, and New England. Today, these varied people all consider themselves Nova Scotians. Review Figures 5-2 and 5-3 and note again the connection between where people live and the relief of the land. Figure 5-4 shows a map of the regions of Nova Scotia that we shall now study.

The Annapolis Valley

In Figure 5-28, we see Mr. and Mrs. Newcombe standing outside their large farm home near Kentville. Figure 5-29 shows the location of the Newcombe Farm, near the Minas Basin.

5—28 Mr. and Mrs. Newcombe in front of their farm home in the Annapolis Valley (Harold S. Bailey photo)

5—29 Map of the Cornwallis Valley (a part of the Annapolis Valley) showing the location of the Newcombe farm (after the Association of Agriculture of Great Britain)



An Annapolis Valley farm* (Figures 5—30 to 5—33)

1. How many acres of land are devoted to each of the following: orchard crops, dikeland, permanent pasture, hoed crops, woods, bush? What other uses of the land are shown?
2. What is the chief orchard crop raised? Name two other fruits that are grown.
3. What evidence is there that Mr. Newcombe keeps livestock?
4. What other income does Mr. Newcombe receive besides his revenue from crops and stock?
5. Study the location of the farm buildings. Are they well located? Explain. In what direction does Kentville lie?
6. How do you know that some land is in danger of flooding? Where is this land located? How is it protected from flooding?
7. Figures 5—31, 5—32, and 5—33 will give you further information about Mr. Newcombe's farm.

(a) Figure 5—31 shows Mr. Newcombe's two sons, Robert and Donald. What are they doing? What season is this? Describe the weather conditions at this season.

(b) Figure 5—32 shows the main hen house on the farm. Locate it on the map. How far is it from Mr. Newcombe's house? From this picture and the map, it is evident that poultry raising accounts for a major part of the income on the farm. Explain this.

(c) Study Figure 5—33. Refer again to the map. What type of land is shown here? How can you tell? Name the river in the picture. What is the land used for?

From our studies so far, it seems likely that Mr. Newcombe obtains his income from fruit growing (mainly apples), stock raising, and poultry. Apples have long been a major crop in the Annapolis Valley, although they have declined in importance since 1940. Before that time, the United Kingdom was the chief market. The demand declined during and after World War II, although there has been some improvement since 1955. A number of other European countries have become important buyers, especially Italy, Germany, and Holland. However, due partly to declining demand and to climatic difficulties,

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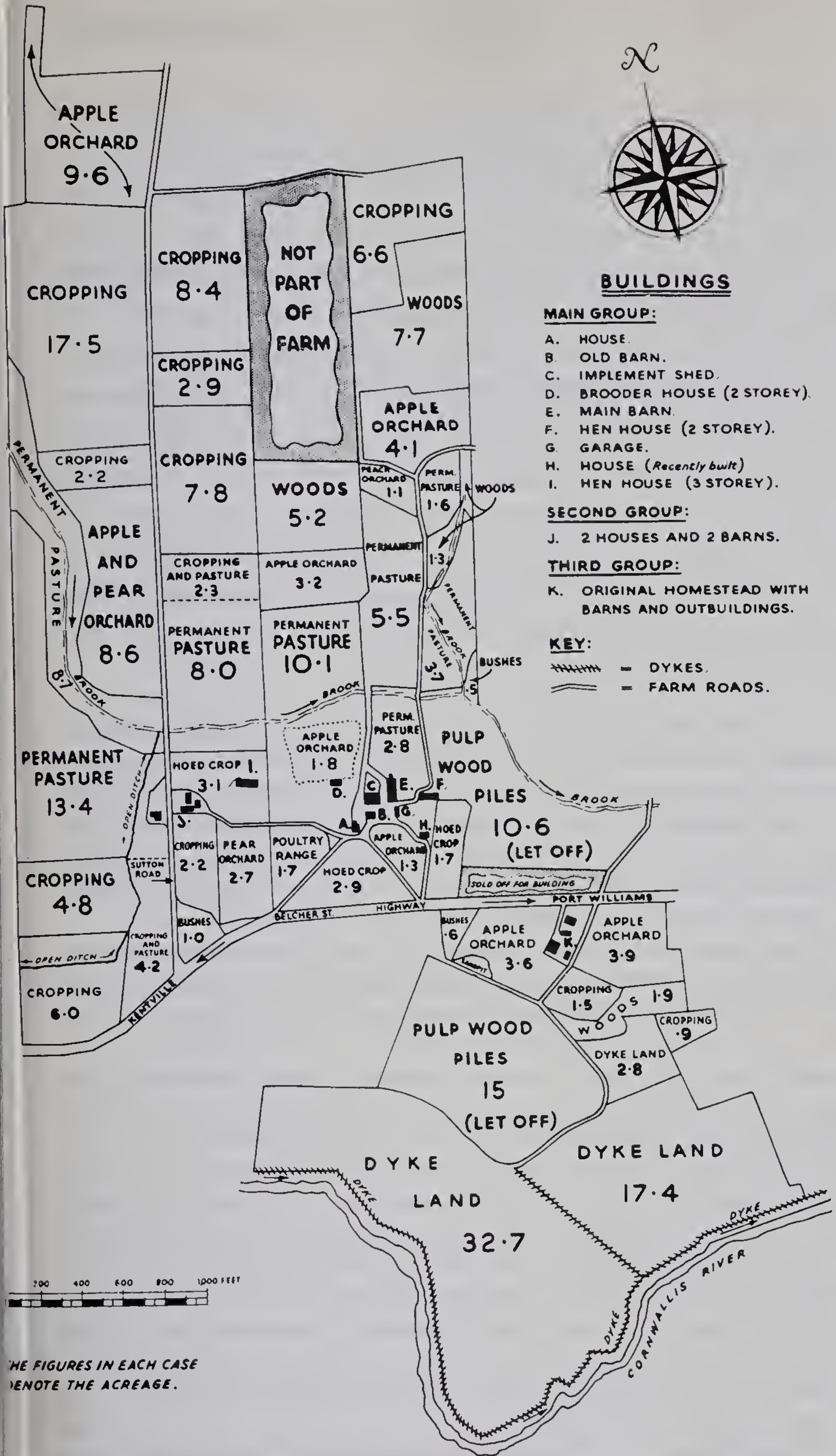
*This farm study has been made available through the courtesy of Miss Joan Bostock and the British Association of Agriculture.



5—30 Map of the Newcombe farm (courtesy of Miss Joan Bostock)

5—31 (below) Mr. Newcombe's sons hard at work picking apples (Harold S. Bailey photo)

5—32 (bottom left) The hen house on the Newcombe farm (Harold S. Bailey photo)

5—33 (bottom right) The dikelands on Mr. Newcombe's farm (Harold S. Bailey photo)

farmers have gradually shifted away from fruit growing to the kind of mixed farming done by Mr. Newcombe. At the same time, many of the orchards have been converted from yellow to red apples, which are more popular. The Annapolis Valley farmers have also formed their own co-operative marketing organization which sells their fruit more profitably and efficiently in the countries named above. An important industry has also been developed, producing canned apples, apple juice, and apple sauce. Orchards thus still provide an important part of Mr. Newcombe's income. Yields range from 95 to 200 barrels of apples per acre of trees. In 1959, about 15,000 boxes of apples were produced on the farm. Of these, about 4000 boxes were lost due to unusually early and severe frosts about harvest time. The way in which climate affects the operation of farms in the Annapolis Valley is shown in these quotations from the annual letters sent by Mr. Newcombe to boys and girls interested in his farm:

1957: "The only bad news this year . . . concerns the peaches which unhappily were a **complete** failure. Last year, we had 500 baskets and this year not a **single** peach. This was all as a result of two days of below-zero weather last winter."
1958: "This year we had a beautiful crop of hay on the newly-seeded dike and were able to harvest it all in good weather. (The new seeding . . . resulted from the ploughing up and re-seeding we had to carry out following the inundation of all our hay land by salt water in 1956.)"
1959: "This will stand out in future years as the year of the early freeze for, contrary to the normal weather pattern, we had a couple of cold nights around October 21st which caused considerable damage. . . . We actually lost 4000 boxes out of a crop of 15,000 boxes, which is quite a lot of apples."
(Mr. Newcombe went on to report that most of the crop that was salvaged was of poor quality and was made into juice. Two steamers that had been chartered to carry the apples from Port Williams to Europe were cancelled.)
1960: "This season has been one of maximum sunshine throughout the spring and summer with very little rain indeed during the summer months. As a result, our fruit is of very high quality. . . . It is maturing about ten days earlier than usual. . . . We had a big scare from Hurricane Donna which did a billion dollars worth of damage along the American seaboard and was supposed to hit us as it travelled north and blew itself out over the Atlantic. Fortunately, we only lost about 10-15 percent of the apple crop in this area, which was a great relief."
(Mr. Newcombe has mentioned hurricanes a number of times in his letters. The American weather experts, who trace these great storms that start in the Gulf of Mexico, choose their names. "Edna" was the last really bad one to reach the Valley. This was in 1954, when most of the apple crop was ruined.)
1961: "We had a late spring with a wet June, which assured us of a good hay crop, but gave us a late blossom. As a result, the apples weren't ready for picking until about ten days later than usual. . . . The apple crop . . . in the Valley as a whole is of wonderful quality this year. . . . Our peaches were also a lovely crop, something that was rather unexpected as we had had considerable winter killing. This can happen due to frost or cold winds, the most harm often being caused by intermittent periods of warm and cold weather. The buds, and even the trees themselves, can be seriously damaged and in a bad season it is

not at all uncommon for all the blossoms on a tree to be killed. With the exception of June, we have had a very dry summer; in fact July and August were so dry that we didn't have enough grazing and had to feed hay to the cows for over three weeks. . . ."

The climate and agriculture of the Annapolis Valley

1. From what Mr. Newcombe has told us in his letters, make a list of the climatic hazards that face farmers in the Annapolis Valley. State some ways in which climatic conditions affect farmers and their crops.

2. Figure 5—34 is a climatic graph of Kentville, a town located a few miles from Mr. Newcombe's farm.

(a) How many months have temperatures below freezing? In what other months might frosts be expected?

(b) Compare January and July temperatures at Kentville with those of your home area. How do the warmth and length of summer at Kentville seem to compare with your neighborhood?

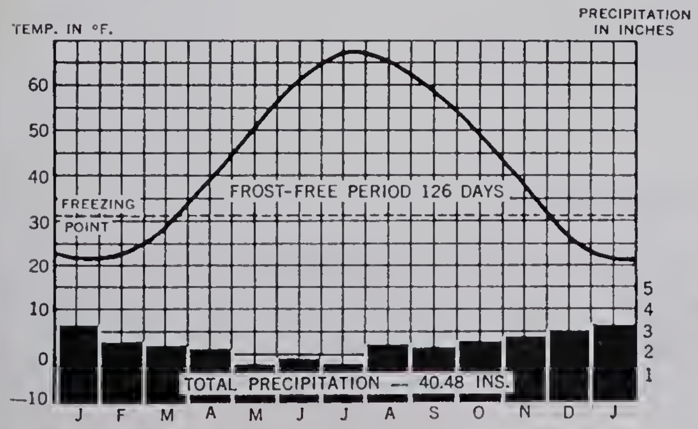
(c) Compare the total annual precipitation at Kentville with that for your area. Kentville receives 82" of snow in an average winter. Again, compare with your neighborhood. Does Kentville seem to have sufficient rainfall during the summer months for successful farming? Explain.

3. A climatic graph gives information in the form of **averages** only. In what ways does Mr. Newcombe's information about the weather during the years 1957-61 differ from the information given in the graph?

4. The frost-free season is a very important aspect of the climate for Mr. Newcombe. Since 1913, the season at Kentville has averaged 125 days. How does this compare with your home area? In 1943 there were only 95 frost-free days at Kentville. In 1937 there were 152 frost-free days. This variation is quite a problem to Mr. Newcombe and other farms in the Annapolis Valley. How did unusually early or severe frosts affect Mr. Newcombe's farm, according to his letters?

5. What conclusions can be drawn from the study of climate and apple growing?

Livestock production is very important on Mr. Newcombe's farm and poultry is a major source of income. The sale of eggs and broilers is very profitable. In 1960 Mr. Newcombe kept 12,000 birds. During the peak of the laying season, nearly 6000 eggs were being marketed every day. Like the apples, these are marketed through a farmers' co-operative. Nova Scotia eggs are famous. Many are sold as far away as Newfoundland, Bermuda, and Montreal.



5—34 Climatic graph of Kentville

Many Annapolis Valley farmers breed hogs. Mr. Newcombe, however, buys all of his as six-week-old weanlings. Hog production on his farm is thus a feeding operation. In recent years, about 400 hogs a year have been marketed. The animals are sent to a co-operative abattoir in Halifax and are sold through the provincial government's Hog Marketing Board.

Mr. Newcombe keeps a large dairy herd. Fluid milk is sold to the dairy in Wolfville, a town some miles to the east. The animals are fed hay grown on the dikelands. Study Figures 5-30 and 5-33 again and note the location and appearance of these lands. The Bay of Fundy is famous for its high tides. In July 1956, unusually high tides broke through the dike shown in Figure 5-33, flooding 50 acres of Mr. Newcombe's most valuable land. Hay for the cattle had to be bought from a farm ten miles away. The salt water had a bad effect on the soil, and Mr. Newcombe had to apply large quantities of lime.

The hoed crops shown on the map of Mr. Newcombe's farm include potatoes. These are of increasing importance as mixed farming continues to develop. Some tobacco is grown in the Annapolis Valley; Mr. Newcombe does not grow any, as his soil is not suitable.

Although farming is the chief occupation in the Annapolis Valley, fishing is also a major source of income. Digby is the chief centre of the industry. The quarrying of gypsum is also important. Nova Scotia produces about 90 percent of Canada's gypsum. This product is used in making cement, plaster, wallboard, and other building materials.

The Annapolis Valley — summary

1. Figure 5—35 shows a view of the Annapolis Valley looking towards South Mountain.
(a) Describe the relief of the valley.
(b) Name two forms of land use evident in the picture.
(c) How does the picture tell us that the Annapolis Valley is a rich and prosperous farming region?
2. From the example of Mr. Newcombe's farm, what are some of the chief forms of land use in the Annapolis Valley?
3. State some problems of the Annapolis Valley farmers in the past and today. How are they trying to overcome these problems?
4. Indicate some other important sources of income in the Annapolis Valley besides farming.

The Northern Mainland of Nova Scotia

Refer to Figure 5-4. Note that the Northern Mainland lies north of the Annapolis Valley and directly east of New Brunswick. According to Figure 5-3, what kind of relief makes up most of this region? The lowland shown is similar to that of Prince Edward Island. Along with

5—35 A panoramic view across the Annapolis Valley (N.S. Film Bureau photo)

the lowland in nearby New Brunswick, it forms the Maritime Basin, a region of fairly good soils, abundant rainfall, and warm summers. In our study of Mr. Newcombe's farm, we noticed a large area of diked marshland. Most of Nova Scotia's diked marshland is found in the Northern Mainland Region. What is the main crop that you would expect to find here? What is likely to be the main source of farm income?

Find Pictou on the map in Figure 5-4. This is the centre of Canada's most important lobster fishery. Figure 5-36 shows a small powerboat loaded with lobster traps, at the start of the lobster season in May. Each trap will be baited with fresh or salted fish, weighed down with stones and then tied to a trapline and lowered into the ocean. A brightly painted pinewood marker floats on the surface to indicate the location of each trap. The main part of the lobster season extends from May until August. The traps are wooden boxes, with a mesh funnel inside. After the lobsters have entered the trap, they are unable to find their way out. When the fisherman goes to collect his catch and rebait his traps, he usually frees any lobsters that are carrying eggs or that are too small. Usually, a lobster less than seven inches long is released. Strict rules have been established to preserve the supply. Even so, only half as much lobster is marketed today as was sold 50 years ago. Lobster is sold as canned, chilled, or fresh meat, or is shipped to market alive. Those shipped alive are packed in special cases, in seaweed and ice. They are shipped by train to places as far away as British Columbia. Nova Scotia's lobsters mainly account

5—36 Lobster fishing along Nova Scotia's Atlantic shore (Nova Scotia Information Service photo)

for the fact that the province earns more from its fisheries than Newfoundland does, even though it employs fewer fishermen and lands a smaller total catch. In fact, lobster (although it is actually not a fish) is Canada's chief seafood export next to Pacific salmon.

Pictou has fish-processing plants and has long been noted for shipbuilding. Small vessels are still made there. Many sawmills are found in the neighborhood, which is one of Nova Scotia's leading producers of lumber. The Pictou coalfield, with eight operating mines, is Nova Scotia's chief producer next to Cape Breton. Trenton has a steelworks and manufactures railway cars. In 1962 a large order for freight cars was placed there by the government of Argentina.

The largest town of the Northern Mainland is Truro. It is an important manufacturing, distributing, and railway centre. Study an atlas map and explain why Truro probably developed as an important railway centre between Moncton and Halifax.

The Interior Mainland of Nova Scotia

The railway journey from Truro to Halifax takes the traveller through one of the great empty areas of the Atlantic Provinces. Study the population map again in Figure 5-2, and note how empty this area is. How does Figure 5-3 help to explain this emptiness? Sawmilling, the cutting of pulpwood, and a little mining are the only activities of note in this rough, rocky, forested area. Glaciers removed the topsoil and left the granite rock near the surface. There are no towns of any size and little farming is carried on.

The Atlantic Shore of Nova Scotia

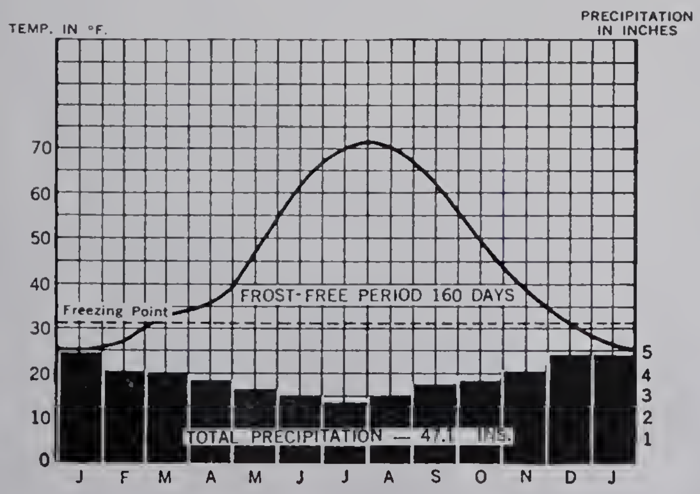
As Figure 5-4 shows, this region is made up of the western and southern strips of the mainland of Nova Scotia. Study Figure 5-2 and explain why it is the most important region of Nova Scotia. Of the three chief occupations — fishing, shipbuilding, and farming — fishing is the most important. Study Figure 5-26 which shows the fisheries of the Maritime Provinces in a series of maps. Name the chief catches landed along the Atlantic Shore and nearby banks. Study item 4 in the exercise on page 211 and note the importance of the Nova Scotia fisheries compared with those of the other Atlantic Provinces. Name the only Canadian province that surpasses Nova Scotia in the total value of its fish products.

A famous old fishing port is Lunenburg which should be located in Figure 5-4. Is it east or west of Halifax? What is its latitude? Is it north or south of your home area? The highly irregular "drowned coast" there was depressed under the great weight of the ice during the Ice Age. Why should such a coast be especially suitable to such industries as fishing and shipbuilding? Lunenburg is the home of one of Canada's most famous deep-sea fishing fleets. In the old days, the famous Bluenose schooners were made there. The first settlers were Germans who came there from Halifax in 1753.

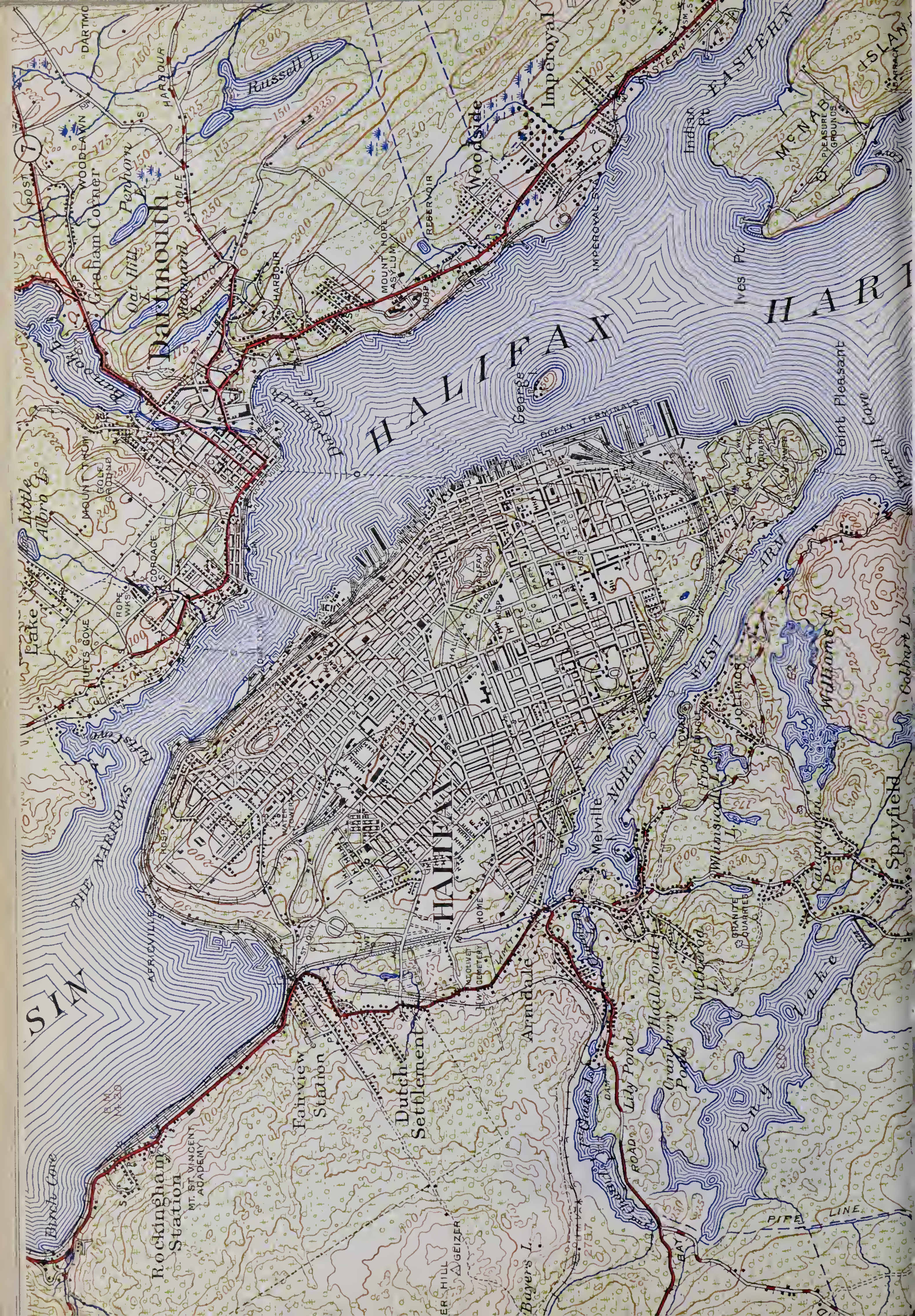
Figure 5-2 shows the interior of a boatbuilding factory at Weymouth, near Digby. The skills developed when Nova Scotia built the world's finest ships are now used to produce small craft such as these.

Farming is not important on the Atlantic Shore. Soils are very poor. Only here and there, on patches of material deposited by former glaciers, is it possible to cultivate the land. Small dairy herds are kept on many farms to supply milk, butter, and cheese to the local towns.

Compare the climatic graph of Kentville with that of Yarmouth in Figure 5-37. Locate Yarmouth in Figure 5-4. Why does it have cooler



5—37 Climatic graph of Yarmouth


HALIFAX
HALIFAX HARBOUR
Dartmouth
THE NARROWS
NORTH WEST ARM
EASTERN
McNAB ISLAND
Woodside
Imperoyal
Russell L.
Penhorn
Oat Hill
Graham Corner
WOODLAWN
Lake
Little Albro L.
TUFTS COVE
ROPE WKS.
CORDAGE
MOUNT HOPE ASYLUM
RESERVOIR
Indian Pt.
Ives Pt.
George I.
OCEAN TERMINALS
Point Pleasant
Purcell Cove
Williams L.
Spryfield
Long Lake
Armdale
Dutch Settlement
Fairview Station
Rockingham Station
MT. ST. VINCENT ACADEMY
Birch Cove
AFRICVILLE
Melville
JOLLIMORE
Lily Pond
Cranberry Pond
Bayers L.
PIPE LINE
HALIFAX COMMON
MT. OLIVET CEMETERY
GRANITE QUARRIES
PLEASURE GROUNDS

summers and milder winters than those of Kentville? Yarmouth, like most of the Atlantic Shore, has the most temperate climate of any place in the Maritime Provinces. However, hurricanes in the fall and severe winter storms often create serious problems. In 1960 a tremendous winter storm covered Halifax with 30 inches of snow.

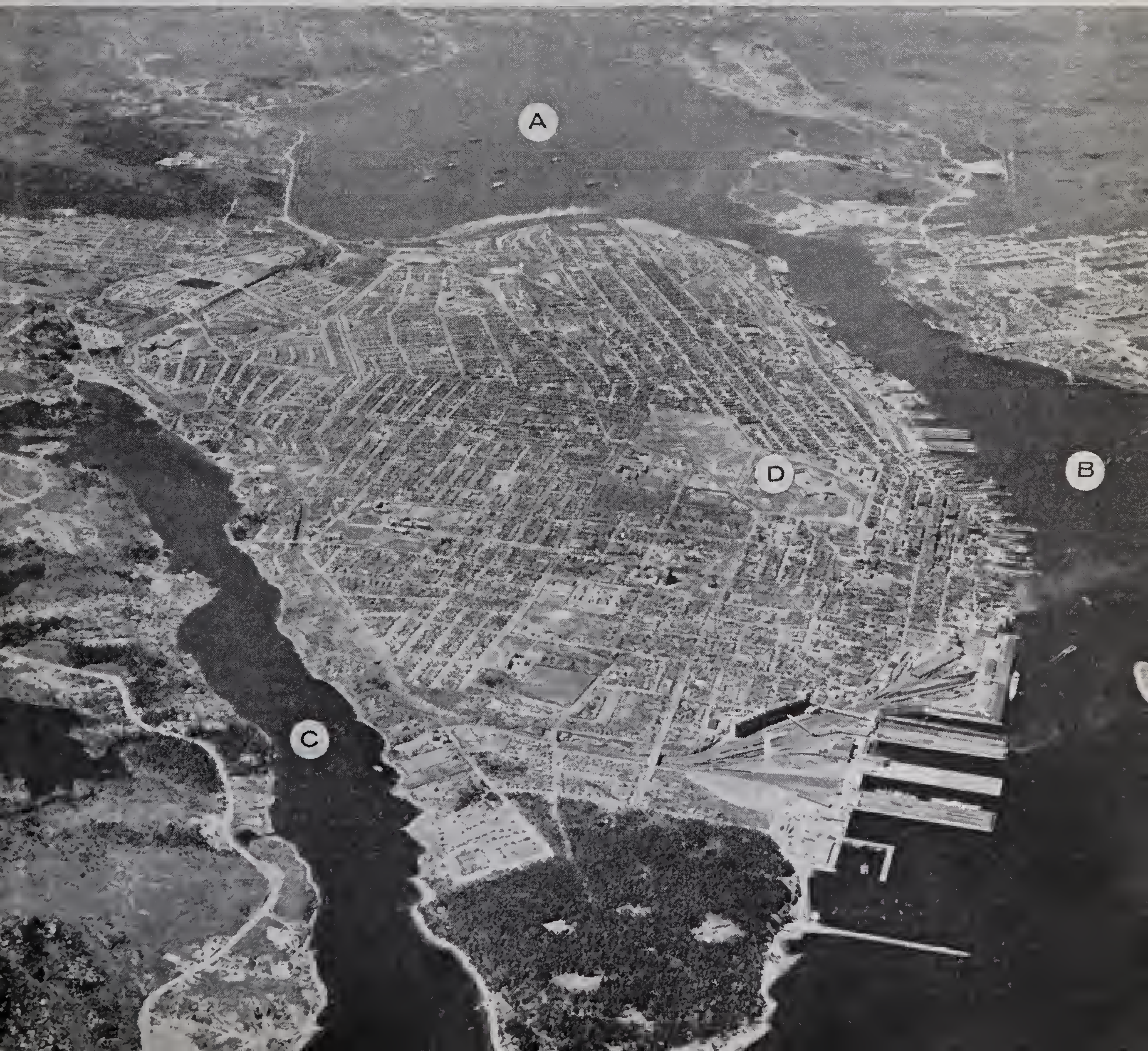
The largest city of the Atlantic Provinces is located on the south coast of Nova Scotia. Halifax was first founded as a British naval base in 1749. Later it became a great fishing port and centre of international trade. Today it is also an industrial city of note.

The Position and Functions of Halifax — Canada's Greatest Atlantic Port

1. (a) Study Figure 5—38. Halifax was once the site of an Indian fishing village called Chebucto, meaning "the great long harbor." The harbor is about

5—38 (opposite) A large-scale map of Halifax in the scale 1:50,000 (after Sheet 11D/12 East half in the National Topographic Series)

5—39 An aerial view of Halifax (Atlantic Air Survey Co. Ltd.)



ten miles long and covers nearly ten square miles. It consists of two main areas — Halifax Harbor and Bedford Basin. Which letters in Figure 5—39 identify these bodies of water? What is the name of the waterway connecting the Basin with the outer harbor?

(b) How can you tell from the photograph that Halifax is an important port? What further evidence does the map provide? Halifax is still an important naval base and during World War II served as the assembly point for Atlantic convoys.

(c) Suggest why Halifax is especially important as a winter port.

2. Name the body of water labelled C. This "drowned valley" is used as a yachting basin. It is lined with many fine homes.

3. Study the site of Halifax itself. Notice that it is almost surrounded by water.

(a) What is such a landform called?

(b) Calculate the area of the built-up region.

(c) Locate a large park on the site. Is this part of the north or of the south end of the peninsula?

(d) In which direction was the camera pointing when the photograph was taken?

4. Rising fairly close to the centre of the peninsula on which Halifax stands is a drumlin, called Citadel Hill. The summit is about 300 feet above sea level and was once an important fortification. Today, it is a popular historic site and contains three museums.

(a) Study Figure 5—40 for a close-up view of the Citadel. What letter has been used to identify the Citadel in Figure 5—39. Locate it on the topographic map.

(b) Name the body of water visible in Figure 5—40.

5. Study the map of Halifax again.

(a) Name the town located opposite Halifax. What letter is used to identify this town in Figure 5—39? In which direction from Halifax does it lie? In the photograph, find the bridge that connects this town with Halifax. Use the map to calculate the length of this bridge.

(b) What is the very important industry visible in the background of Figure 5—40? What symbol indicates it on the map? What is the name of the settlement there?

(c) Notice the large buildings beside the harbor with the great smokestacks. Much of Halifax's electricity is generated here. What method is used to make this electricity? Why is the generating plant located on the waterfront?

6. So far, we have studied the city as a great centre of water transportation. How does the map tell us that it is also an important centre of land routes? In Figure 5—39 where are the important railway yards in the city? Use an atlas to find the destinations of road and rail routes from Halifax.

7. Important goods handled at Halifax in 1961 were the following:

Loaded	**Unloaded**
Wheat	Coal
Gypsum	Sugar
Refined petroleum products	Crude petroleum
	Fish

(a) State the likely source of the goods listed above.

(b) Name some manufacturing or processing industries that you would expect to see at Halifax, judging from this list.

Halifax Harbor has a minimum depth of 51 feet. It can thus accommodate the largest vessels afloat. It has 31 miles of railway and 7 miles of berthing. There are also large grain elevators, a cold storage

5—40 A view of the Halifax Citadel. Many other features of Halifax may be seen in this picture (Nova Scotia Information Bureau photo)

warehouse, and many oil storage tanks. In 1958 a total of 2148 vessels called at Halifax. The port handled more than 6,000,000 tons of goods.

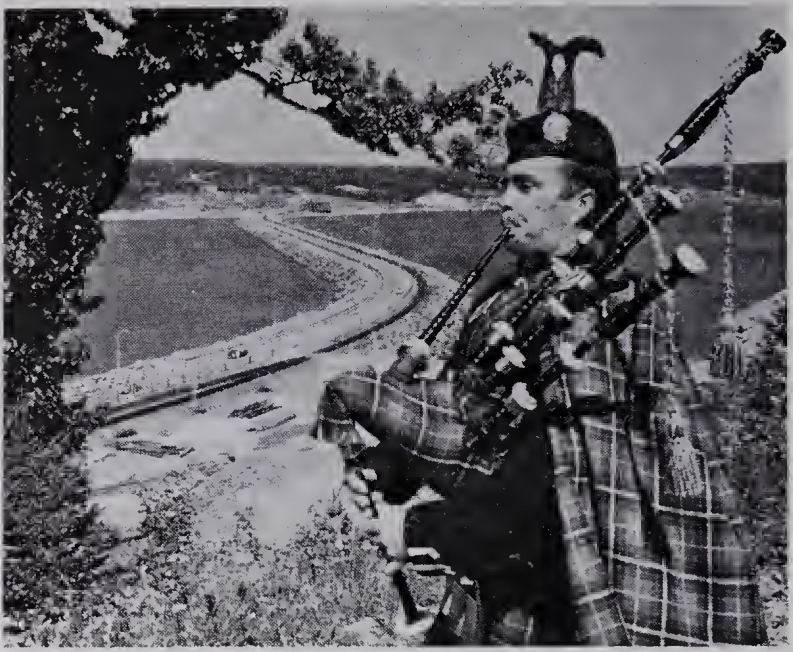
Halifax not only functions as one of Canada's greatest ports. It is also a manufacturing and transportation centre. In addition to the industries suggested by our study of the goods handled by the port, there are important shipbuilding plants and dockyards. Halifax has excellent railway connections with most parts of the Maritime Provinces and with Quebec and Ontario. We have already noted that the city's electricity is mostly obtained from thermal plants. Nova Scotia has few streams large enough to produce much hydro-electric power.

Halifax has long been the capital of Nova Scotia. It is also an educational centre of note. Dalhousie University is one of Canada's oldest and best universities. In 1961 the city had a population of 92,511. Its metropolitan area, including Dartmouth, had more than 183,000 people.

Halifax easily ranks first in size among all the cities of the Atlantic Provinces. It has no rivals as a business and commercial centre.

Halifax and the Atlantic Shore — a summary

1. An atlas map shows that Halifax is in a fine position to trade with many areas that border the Atlantic Ocean. Name several of these areas. In spite of this, and in spite of the fact that its port is open all winter, it is not nearly as large nor important a port as Montreal. What are some reasons for this?
2. "Location, the sea, the seacoast, and a long history have made the Atlantic Shore an important region of Nova Scotia." Explain why you agree or disagree with this statement. Is it true that the land of this region contains few resources? Explain your answer.



5—41 A view of the Canso Causeway. The piper welcomes tourists to Cape Breton Island. (Nova Scotia Information Bureau photo)

Cape Breton Island

This region of Nova Scotia was probably first visited by John Cabot. Later, it was occupied for many years by the French. In fact, the *Breton* sailors (from Britanny in northwest France) first gave the island its name. French and other fishermen used to fish off its coasts. In this section, we shall learn how Cape Breton developed after it became a British colony in 1763. We shall also learn something about its modern geography.

People and the land in Cape Breton Island

1. Figure 5—41 shows the Canso Causeway which was opened in 1956 to connect Cape Breton Island with the mainland of Nova Scotia.
(a) Refer to an atlas to find the name of the narrow strip of water that separated these two land areas before 1956.
(b) Which two bodies of water does this strait connect?
(c) Name two forms of transportation that use the causeway.
(d) How do ships proceed from the Gulf of St. Lawrence to the Atlantic Ocean?
2. (a) Study the costume of the piper in the picture. What clue does this give you to the country of origin of many people who live in Cape Breton today? The ancestors of these people came from the British Isles mainly during the period 1815-1850.
(b) Describe the chief physical features of the Cape Breton Highlands and coast, as seen in Figure 5—42. How would this have reminded the early settlers of their homeland?
(c) Study Figure 5—3c. Which part of Cape Breton Island consists of highland? What is the highest elevation there, according to the map?
3. Figure 5—42 shows one of the few areas of lowland in Cape Breton Island. Describe its location in relation to the highland. Why is nearly all the settlement on the lowland? Both this picture and Figure 5—3c were taken within the boundaries of one of Canada's most scenic national parks. Describe how you would drive to this national park from your home. The tourist industry is one of the most important sources of income to the people of Cape Breton Island.

5—42 Sunrise Valley in **Cape Breton Highlands** National Park (Nova Scotia Information Bureau)

How has the construction of the Canso Causeway assisted this industry?
4. Study Figure 5—2. Describe where most of the people of Cape Breton Island live. Which city is the main centre of population?

From the preceding assignment, you have learned that Cape Breton Island is a rugged land, inhabited mostly by people of Scottish descent. It has an important tourist industry. Why is farming not important? Hay is the chief crop and a dairy industry supplies local needs. Many farmers are part-time fishermen. Lobster is the most valuable catch.

Coal is the most important mineral resource of Cape Breton Island.* Figure 5-43 shows a group of miners, 12 to a car, being carried to the

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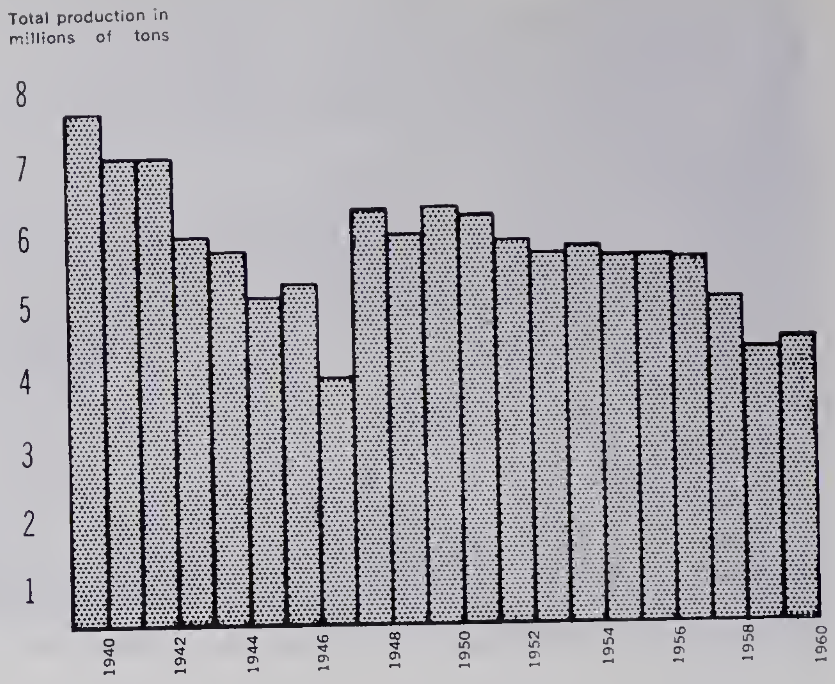
*The following account of coal mining is based on materials in C. R. Dunphy's *The Geography of the Atlantic Provinces*, published by W. J. Gage Limited, 1960.

5—43 Coal miners on their way to work, New Waterford (Dosco photo)

5—44 Annual coal production in Nova Scotia 1940-1960 inclusive

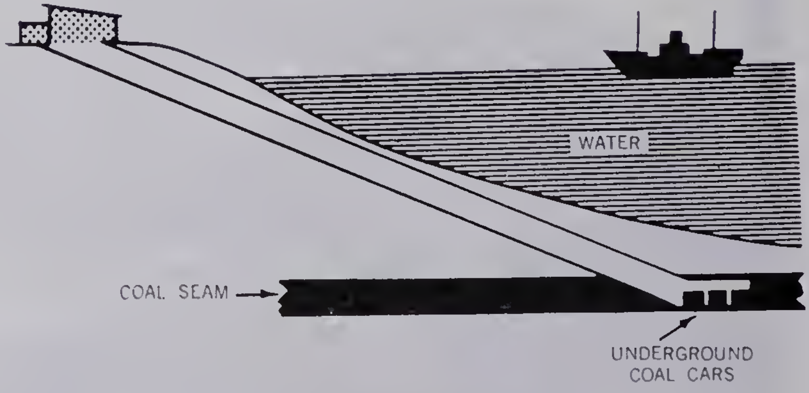


coal seams deep under the ocean, off the coast of the island. Study the picture carefully. Describe what each man is wearing on his head. Why are the miners equipped in this way? Each individual mine and its buildings is called a *colliery*. Several diagrams and photographs will explain how a colliery operates and is organized. Figure 5-44 shows a graph of Nova Scotia's coal production since 1940.

Coal-mining — Nova Scotia's problem industry

1. (a) What has been happening to Nova Scotia's coal production since 1940? What are the reasons for this trend?
(b) Montreal and Toronto buy American coal. Why is this? What problem, therefore, faces Nova Scotia's coal industry?
2. The mine that the men are entering in Figure 5—43 is called a **slope mine.** Figure 5—45 shows a diagram of such a mine. Why is "slope" a good name for it? The men in the picture in Figure 5—43 must travel two or three miles to reach the seams or **coal face.** Most collieries are located directly on the coast. Such a colliery is shown in Figure 5—46. This picture was taken near Glace Bay. Locate this important town in Figure 5—4.

5—45 Simplified diagram of a slope mine (after C. Dunphy)



5—46 A colliery on the edge of the sea near Glace Bay. The mines of this colliery extend far out under the ocean. (Dosco photo)

When the men shown in Figure 5-43 reach the coal face they will be directly under the Atlantic Ocean. Water seeps into the mines and must be pumped out. In some pits, nearly four tons of water are removed for every ton of coal mined. Many miles of railway are found in these underground mines. Usually, a 15-ton trolley locomotive hauls a train of 3-ton aluminum mine cars.

It is important that mines such as those we have studied be supplied with fresh air. This is done by a fan, which is operated by a motor. In this way, dangerous gases are prevented from accumulating and causing explosions. Even so, mining is a dangerous occupation. Besides explosions, there is always the danger of a cave-in. During the period 1950-1960, more than 300 Nova Scotia miners lost their lives underground.

Coal is removed from the seams by cutting machines and by blasting methods. Study Figure 5-47. A cutting machine is much like a caterpillar tractor. It has chains at the front, on which are a number

5—47 Modern machinery cuts the coal face in a Cape Breton mine (Dosco photo)

of picks. As the chain is driven by a motor, it cuts coal from the face. As it does so, the machine loads the coal on to a conveyor belt. Such a machine can cut and load 500 tons of coal during an eight-hour shift. Seven men are needed to operate it. These include a foreman, two operators, three timbermen, and a mechanic. The timbermen place pit-props to hold up the roof of the mine.

The other method of mining requires that blasting powder be placed in holes drilled in the coal face. This breaks away large chunks of coal.

After the coal has been mined it must be brought to the surface. Conveyor belts carry it to a place where it is loaded into mine cars. After the coal reaches the surface, it is sorted, cleaned, and washed with oil before being shipped to market.

The Nova Scotia coal industry faces many serious problems. In addition to the loss of markets resulting from the use of oil by trains and ships and in our homes, there has always been the problem of the distance of coalfields from the large cities of Ontario and Quebec. There are also serious problems related to the mining of the coal itself. Why is it so expensive to mine?

In conclusion, we shall consider some uses to which Cape Breton coal is put. It is still used by some railways and steamships and in many homes in the Atlantic Provinces. A considerable amount is used to produce electricity in thermal plants. Which large city gets its electricity in this way? Prince Edward Island imports Cape Breton coal for this purpose. A major market for coal is the great iron and steel industry at Sydney.

5—48 Blast furnaces at the Sydney steel plant, an aerial view (Dosco photo)

Sydney — a major Canadian iron and steel centre

1. In Figure 5—48, notice the large light-colored building near the centre of the picture. This is a thermal power plant where electricity is generated from coal and from excess gases from the blast furnace. How can you tell that this is a busy industrial centre?
2. Why does the Sydney steel plant seem to be well located? What means of transportation are available to it?
3.(a) Iron, coal, and limestone are needed to produce steel. From your studies so far in this chapter, state where iron and coal are obtained for use in the steelworks shown in the picture.
(b) Locate Sydney in Figure 5—60. Notice that it is surrounded by coalfields. How does the map indicate that these fields extend under the ocean? The limestone used at Sydney comes mostly from Newfoundland.

The steel factory studied in the preceding questions is one of the largest in Canada. It covers nearly 500 acres. Steel ingots and rails are the chief products. It is cheaper to ship ingots for processing to other centres in Quebec and Ontario and elsewhere than to make them into steel products at Sydney itself. However, Sydney produces nearly half of Canada's rails. Steel bars and rods, wire, and nails are also made there. The railway rolling stock made at Trenton, near Pictou, uses Sydney steel.

Identifying the regions of Nova Scotia

Copy this chart into your notebook and use the material you have studied on Nova Scotia to complete the other columns.

		Annapolis Valley	**Northern Mainland**	**Interior Mainland**	**Atlantic Shore**	**Cape Breton Island**
Landscape		Rolling farmland with woodland areas				
Farming		Mixed farming (dairy emphasis) Apples a specialty				
Industries	fishing	Fishing				
	forest ind.	Not important				
	mining	Gypsum				
	manufacturing	Canning apples, juice and apple sauce				
	others	Tourism				
Population density and distribution		Dense rural population				
Cities		Digby				

NEW BRUNSWICK

The boundaries of New Brunswick

1. Which body of water separates New Brunswick from Prince Edward Island? From the Gaspé Peninsula?
2. Study the northwestern area of New Brunswick.
(a) What kind of land makes up this corner of the province?
(b) How does this fact help to explain that travel between New Brunswick and Quebec has always been difficult?
3. (a) Name the American state that borders New Brunswick on the west.
(b) Which great river drains part of this state and most of New Brunswick, forming part of the boundary between the United States and Canada?
4. Trace the railway line between Montreal and Saint John. From Saint John, the C.P.R. proceeds to Halifax. Passengers and freight must be carried by ferry to Digby, on the Nova Scotia side. Name the body of water that is crossed on this journey.
5. Find the narrow neck of land that joins New Brunswick and Nova Scotia. This is the Isthmus of Chignecto. For many years, people have talked of building a canal across this isthmus.
(a) Name the two bodies of water that would be joined if this canal were built.
(b) In what ways would Saint John benefit from such a canal? Name some places in Eastern Canada that could trade more easily with Saint John by means of such a canal.
(c) In what other ways would the canal improve trade among various places by reducing the length of trips by water? So far, the Canadian Government is not sure that the Chignecto Canal would be valuable enough to offset the great cost. It may be built some day, however.

Southern New Brunswick

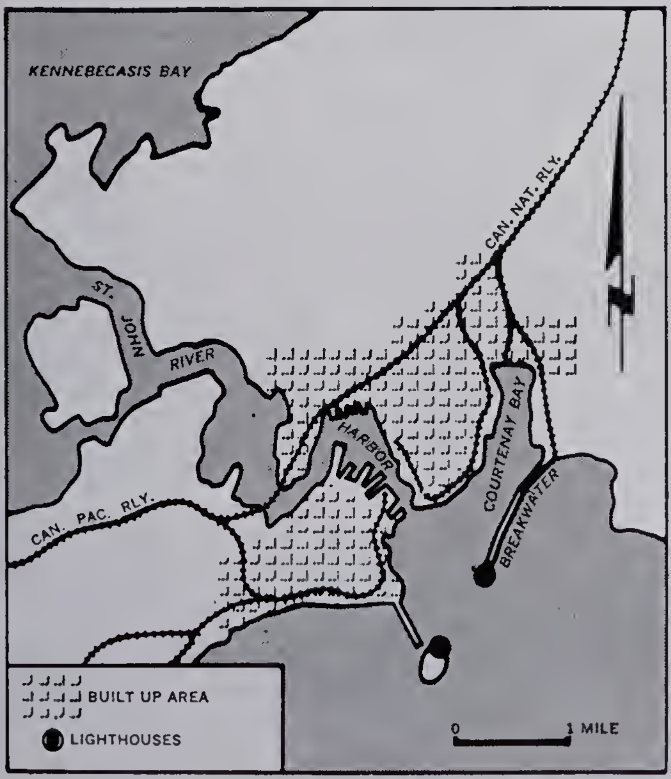
Locate this region in Figure 5-4. It consists of both highlands and lowlands. The former areas reach elevations of 1400 feet above sea level. They consist of very old and very hard rocks. The chief lowland area is found to the east where diked marshlands extend into Nova Scotia. Trace the course of the St. John River in Figure 5-4. Name the important city located at its mouth. This city is the oldest in New Brunswick, and the region we are now studying was the first to be settled. The earliest settlers were French and occupied the eastern marshlands already mentioned. The first large-scale English settlement dates from May 18, 1783, when 20 vessels landed 3000 settlers near the present site of Saint John. Within a year the town had a population of 9000 and the province of New Brunswick was born.

During the first century of Saint John's existence it came to be known as the lumber capital of the world. Before the American Revolution, the British Navy obtained lumber for its ships from the Thirteen Colonies. After the colonies became independent, England was forced to turn to the forests of New Brunswick. These forests were a wonderful source of the pine masts that were in great demand at that time.

An early visitor to Saint John described "an extraordinary stick," measuring 32 inches square and 120 feet long. When England was at war with Napoleon, between 1800 and 1815, timber was no longer available from Europe. Thus, the first timber ships called at Saint John in 1808. Most of the timber was square timber, of the type described in Chapter 2. It consisted of red and white pine logs, hewn by axes. These were floated down the rivers in rafts, such as those we noticed in Figure 2-64 (Chapter 2). Saint John and Quebec became the great timber ports of Canada. More than 1400 vessels were required to carry the cargoes. Since these vessels were also made of wood, the timber trade was promoted even more. Saint John thus became one of the great ship-owning and shipbuilding ports of the world. Ships were also needed for the growing fisheries and for the trade with the West Indies. Railways were also built at this time, to transport lumber.

Today very few "extraordinary sticks" may be seen in New Brunswick. The great trees were quickly cut down and large areas of forest were burned over. The sticks used in the modern pulp and paper industry are a poor sight beside the mighty spars of the old days. However, the production of pulp and paper is important and, as we shall see later, the government of New Brunswick is trying to restore the forests of the province.

A study of Saint John will suggest why it is the largest city of New Brunswick and the second centre of population in the Atlantic Provinces.



5—49 A map of Saint John, New Brunswick

Saint John — Canada's second Atlantic port (Figures 5-49 and 5-50)

1. (a) Name the bay that lies outside the harbor.

(b) How is the entrance to the harbor protected? Which letters in the photograph identify the two features mentioned so far?

2. (a) Which letter identifies the harbor area on the photograph?

(b) How is the St. John River identified? The famous harbor was first discovered and mapped by Champlain in 1604.

3. Study the following list of the leading goods that were handled at the port of Saint John in 1961:

Incoming	**Outgoing**
petroleum	grain
fuel oil	newsprint
gasoline	flour
raw sugar	lumber
motor vehicles	

(a) Suggest where these goods probably came from.

(b) Name some important industries of Saint John that might be based on the incoming goods.

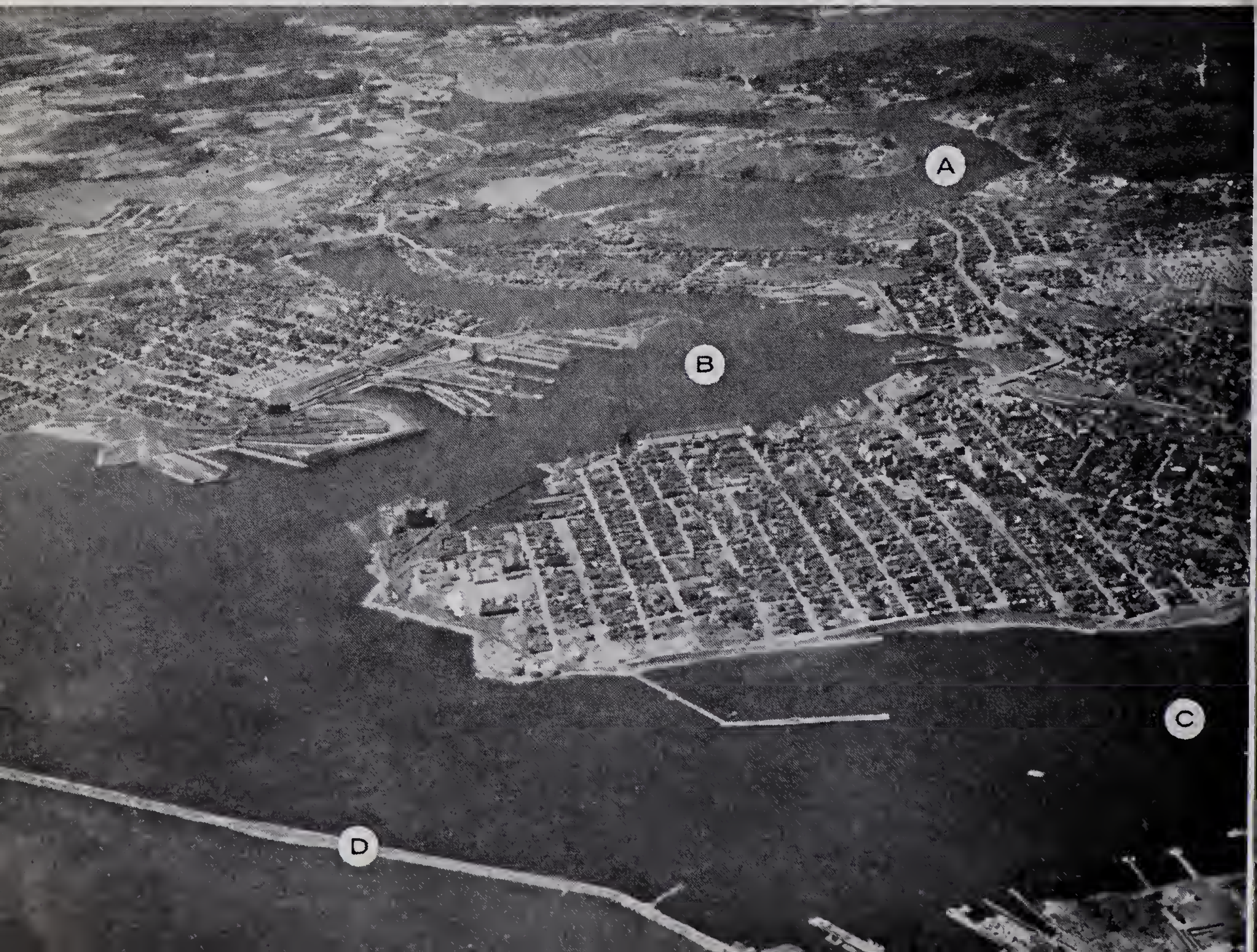
(c) Name two of the outgoing goods that were probably processed in Saint John.

(d) The harbor like Halifax is busiest during the winter season. Explain why.

4. Study the railway lines that enter Saint John.

(a) Name the line that reaches the city from the west. Saint John is the eastern terminus of this line, although it does extend to Halifax.

5—50 An aerial view of Saint John (New Brunswick Travel Bureau)



(b) Saint John is also considered to be the New Brunswick terminus of the C.N.R., which reaches the city from the northeast. Name the important railway junction from which this line extends to Saint John.

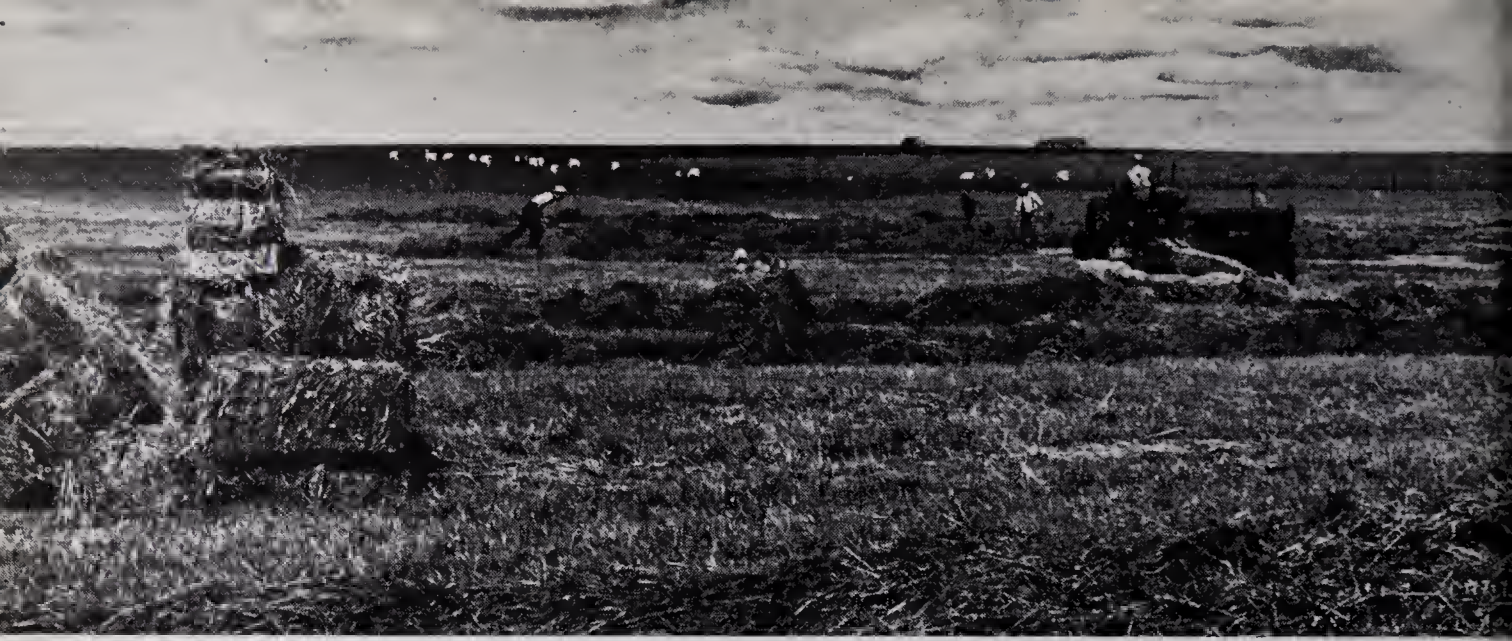
In addition to the industries already noted, steel goods are made at Saint John, using ingots produced at Sydney. Shipbuilding and ship-repairing are important and Saint John has the largest drydock on Canada's Atlantic coast. Fish processing is important.

The fishing industry of New Brunswick is based on the valuable fisheries of the Bay of Fundy. This bay is funnel shaped. Refer to an atlas map and estimate its length. It is between 30 and 50 miles wide. The funnel narrows at its eastern end and this causes the high tides for which the Bay of Fundy is famous. The incoming tide is constricted by the eastern end of the funnel, causing the water to be raised by as much as 60 feet. The rivers that drain into the bay are affected by this tide. Visitors to Saint John are often amazed to see that a ship lying at anchor may be raised or lowered as much as 10 to 15 feet in an hour or two. This explains the famous Reversing Falls of the St. John River. When the tide is in, water flows *up* the river, cascading over the rocks in its path. When the tide is out, the natural flow of the river is restored, as the water drops 15 feet into the Bay of Fundy.

The great tides just mentioned bring the valuable plankton on which fish thrive. From Figure 5-26, name the types of fish caught off New Brunswick's Fundy shore. The most valuable of these are herring, and especially the famous sardine herring. The centre of this industry is Black's Harbor, site of one of the world's largest sardine canneries. Sardines are sold in South Africa, the United States, the West Indies, and South America. Along with lobster and cod, they make up the most valuable exports of the Atlantic fisheries.

Farming in southern New Brunswick is confined to small valleys near such cities as Fredericton, Moncton, and Saint John. The chief features of it are illustrated in Figures 5-51 and 5-52.

5—51 Cattle grazing near Sussex in Southern New Brunswick (New Brunswick Travel Bureau photo)



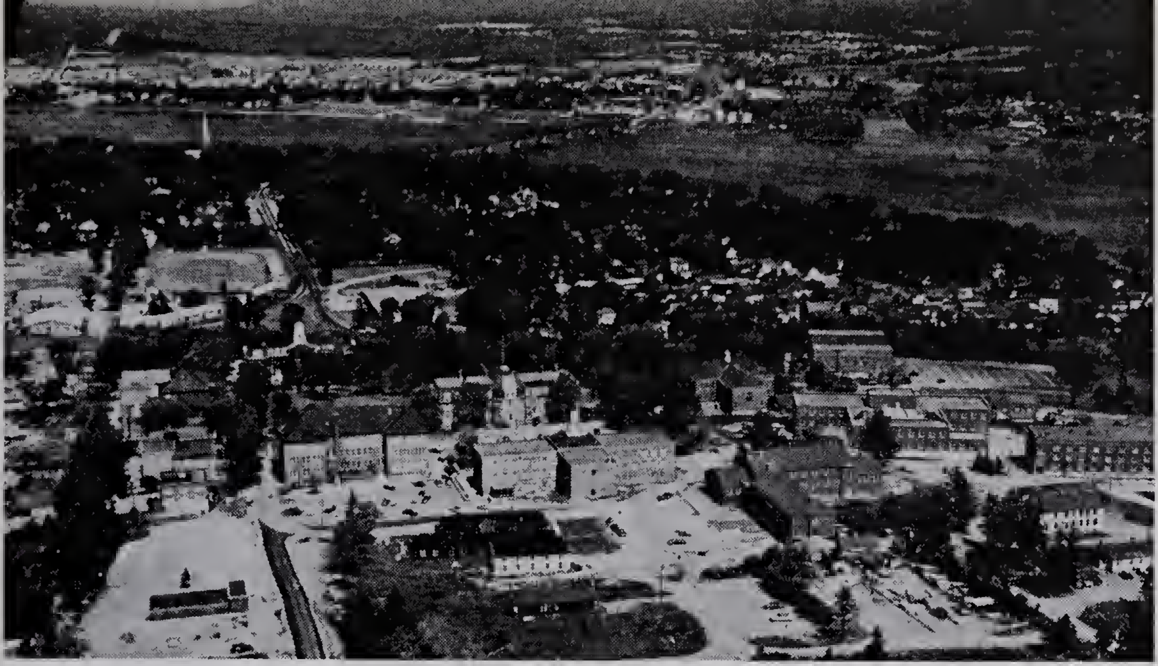
5—52 A scene on the Tantramar Marshes in Southern New Brunswick (New Brunswick Travel Bureau photo)

How are the farmlands used?

1. Figure 5—51 is a scene near the town of Sussex, between Saint John and Moncton.
(a) Judging from this picture, what are the chief sources of farm income there?
(b) Study the land in the distance. Describe this valley. Where are most of the buildings located? Does this look like a prosperous farming valley? Why do you think so? Where would the farmers sell their products?
2. Figure 5—52 shows part of the largest area of farm lowland in New Brunswick. These are diked marshlands, called the Tantramar Marshes, that have been mentioned before. These rich soils have been deposited for many thousands of years by the Bay of Fundy tides. Describe the relief of the land. How is this an advantage to farming operation?
3. (a) What are the men in Figure 5—52 doing?
(b) Describe the two main uses of the land as seen in the picture.
4. (a) What use is probably made of the buildings in the distance?
(b) Why are few, if any, houses likely to be seen on the Tantramar Marshes?

In addition to haying and dairying, the growing of potatoes, other vegetables, and apples are important farming activities in Southern New Brunswick.

Some mining is carried on in the region. New Brunswick's only important coal deposit is found at Minto, east of Fredericton, where open pit methods are used. In what way are these operations different from those we studied in Cape Breton? The coal here is of poor quality, but is useful in manufacturing thermal electricity. New Brunswick has five plants that use steam generators. Two of these are at Saint John. The province is aiming to maintain a balance between hydro and thermal electricity. The thermal plants are especially useful in maintaining a supply of electricity during the late summer and fall when hydro-electric production declines. Why does hydro-electric production decline at these seasons? Oil, natural gas, and



5—53 A view of part of Fredericton (New Brunswick Travel Bureau photo)

gypsum are mined around Moncton. This city, once a shipbuilding centre, is today best known as one of the leading railway centres of the Atlantic Provinces. Oil refining, meat packing, and the making of wood and metal products, and textiles are the chief industries. Moncton is New Brunswick's second largest city.

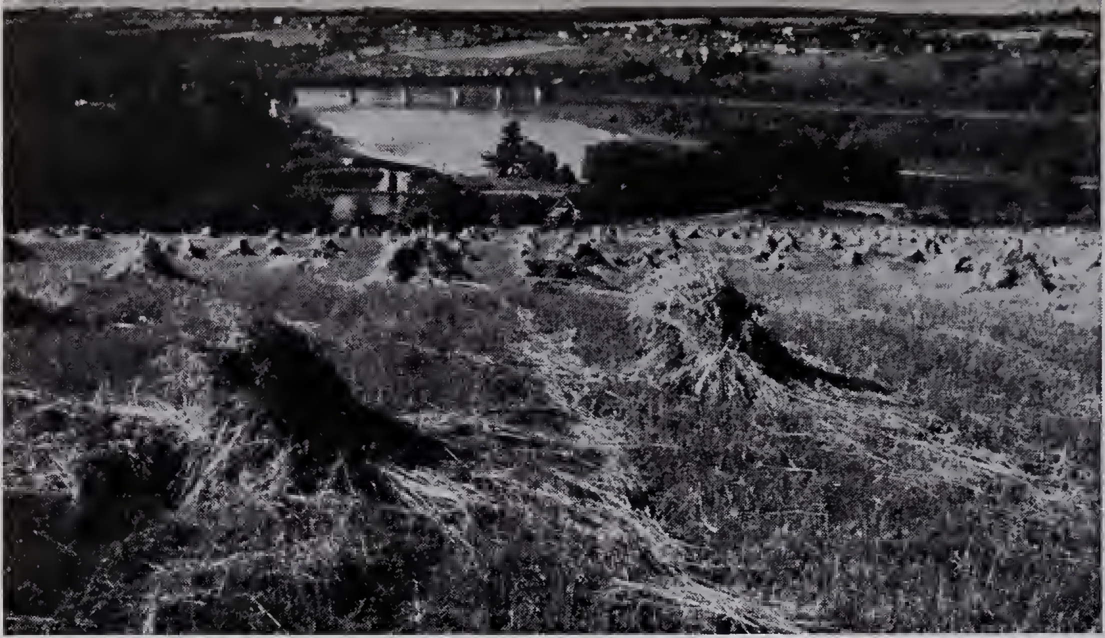
Fredericton is the third city of Southern New Brunswick. Part of it is shown in Figure 5-53. Name the river visible in the distance. Describe the nature of the land in the far distance in the photograph. The buildings in the foreground belong to the University of New Brunswick. This is one of the oldest universities in Canada and is especially famous for its forestry school. The downtown area of Fredericton is shown between the university and the river. Find the spire of Christchurch Cathedral which was built during the period 1845 to 1853. To the right of the cathedral is the C.N.R. railway bridge. Refer to an atlas, and state why Fredericton's location made it a good choice for the capital of New Brunswick. Fredericton has important lumber, textile, and woodworking plants. Printing and the making of footwear employ several hundred people.

The Upper St. John River Valley

Refer again to the population map in Figure 5-2. How does the St. John Valley stand out on this map? Above Fredericton, the river valley is the second-ranking region of population and industry in New Brunswick. A study of this region can best be made by means of several photographs, a graph, and a profile of the valley.

The landscape, land use, and climate in the Upper St. John Valley

1. (a) What form of land use is indicated in the foreground of Figure 5—54. (b) Suggest some products sold by farmers in this region.



5—54 Hayfield overlooking the St. John River Valley (New Brunswick Travel Bureau photo)

(c) Study the bridge in the picture. It is the longest covered bridge in the world. There are many covered bridges in this part of Canada, although none are being built today. What does the presence of covered bridges suggest about winter climate in the region?

2. Study the buildings in the far distance.

(a) Describe their location in relation to the St. John River. The landform on which they are located is called a **terrace.***

(b) Describe the relief of the land in the far distance.

3. What are the men doing in Figure 5—55? The potatoes shown here are the most valuable crop of the Upper St. John Valley. In several areas potatoes occupy more acreage than any other crop. In a few places they account for half the land cropped on an average farm. On one farm near Grand Falls we find that the land was used in the following way, in 1956:

Pasture	14.7 acres
Oats	19.8 "
Hay	16.5 "
Potatoes	20.5 "

The rest of this 135-acre farm consisted of unimproved land and woodlots. The farmer owned a tractor and kept the following livestock: 11 cattle, 6 sheep, 3 swine, and 55 poultry.

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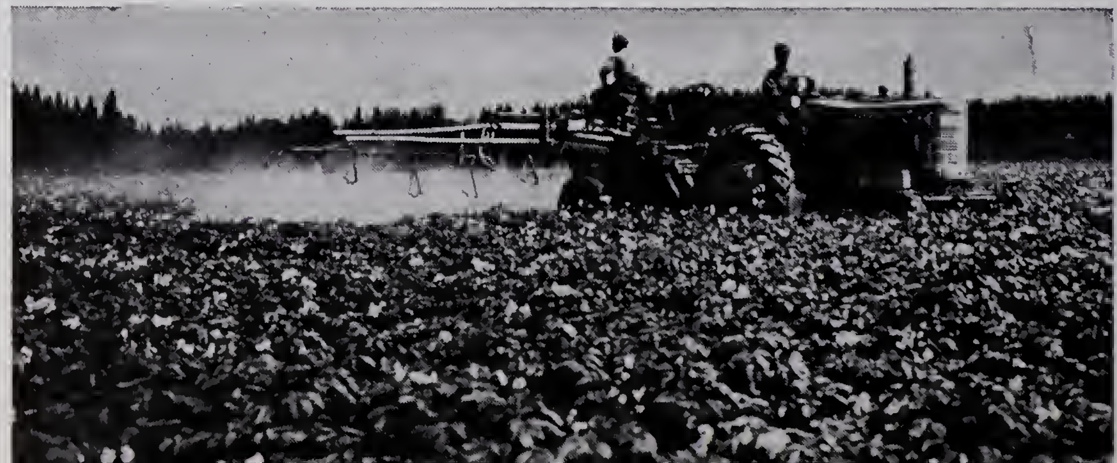
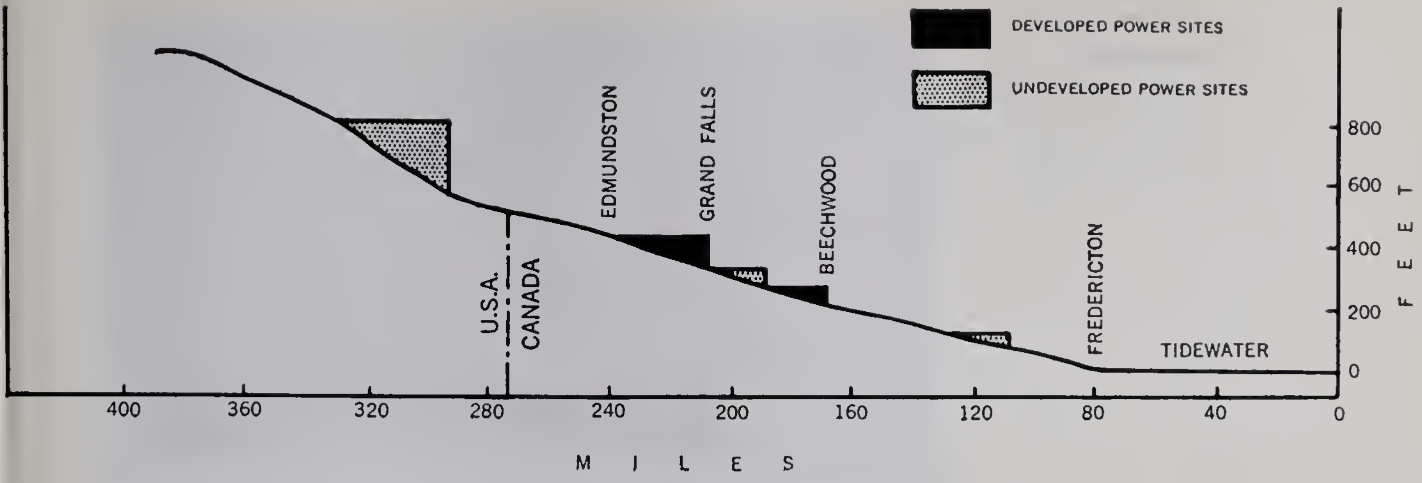
*A terrace is an elevated, fairly level stretch of land running parallel to and above the bank of a river or lake. Sometimes there are several terraces, each representing a former level of the valley floor.

5—55 Spraying a potato field in the St. John River Valley (New Brunswick Travel Bureau photo)





5—56 Profile of the St. John River (after the **Atlas of Canada)**

4. (a) Where does the river have its source according to Figure 5—56? How high above sea level is this source? What is the elevation of the St. John River and where does it enter Canada?

(b) Locate Edmundston in Figure 5—4. This town of 13,000 people is largely French-speaking. Most of the people in the Upper St. John Valley are French Canadians. Lumber is floated to the mills at Edmundston via the St. John River and its tributaries. How is it used? Figure 5—60 will assist in answering this question. Edmundston is a leading centre of this industry.

(c) Judging from the profile, where do you think Edmundston probably obtains its hydro-electric power?

(d) Some of the products of Edmundston's mills are exported from Saint John. How many miles must they be transported to the docks of that city?

(e) How many developed power sites are there on the St. John River? Figure 5—57 shows the development at Beechwood. How many miles is this from Fredericton? The latter city receives most of its hydro-electric power from there.

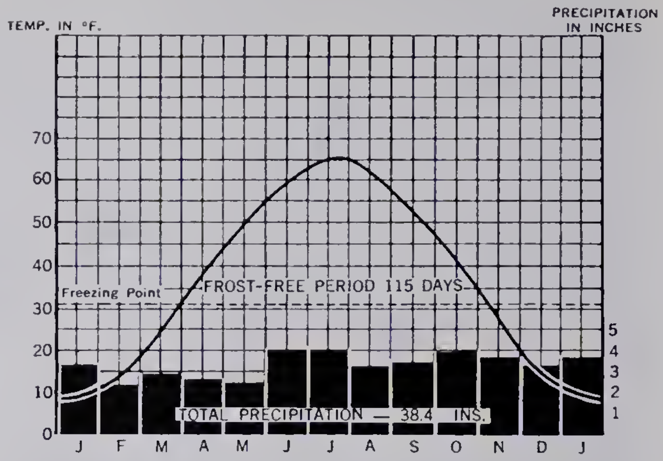
(f) Where does the St. John River reach tidewater? How many miles is this above its mouth?

5. Figure 5—58 shows the climatic graph for Grand Falls on the St. John River in northwestern New Brunswick.

(a) What is the January average temperature at Grand Falls? How many months have an average temperature below freezing? Compare winter temperatures here with winter temperatures where you live.

5—57 The Beechwood hydro-electric project (New Brunswick Travel Bureau photo)

5—58 A climatic graph of Grand Falls



(b) Nearly all the precipitation that occurs during the months from November to March inclusive occurs as snow. How many inches of snow does Grand Falls receive in an average winter?

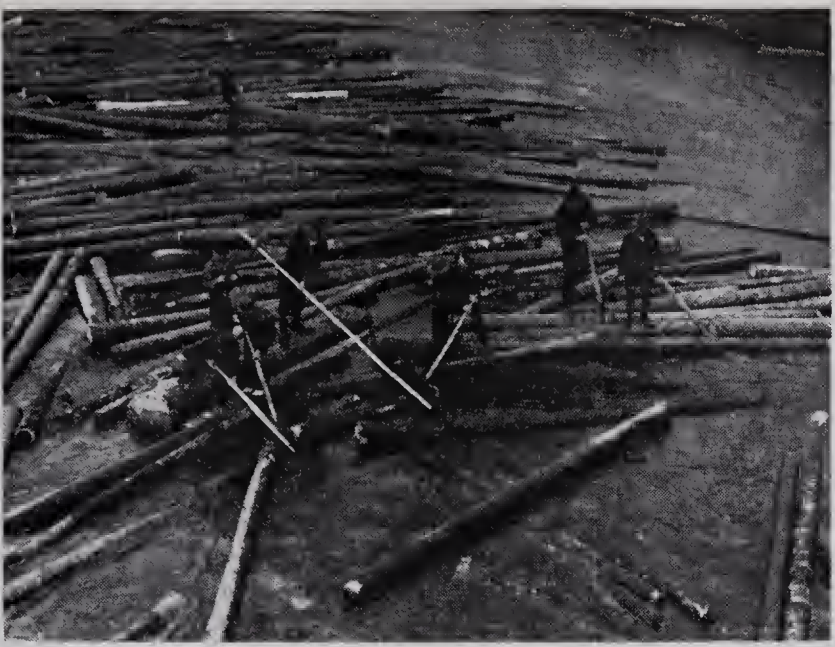
(c) What is the July temperature at Grand Falls? Again, compare this with July conditions where you live. In this part of New Brunswick, the growing season is seldom longer than 100 days. In some highland areas east of Grand Falls, it is as short as 60 days.

(d) Compare conditions at Grand Falls with those at Yarmouth, which you studied in Figure 5—37. Try to account for the differences. Write a brief description of the climate at Grand Falls. Notice how it compares, especially in winter, with the climate in many places in northern Ontario and Quebec. What effect does this climate have on farming?

The Upper St. John Valley is the chief agricultural region of New Brunswick and one of the most important regions of the Atlantic Provinces. The best farmlands in New Brunswick are found there. The soils are good, although the growing season is short. The central part of the valley, around Woodstock, produces fine potatoes, which are New Brunswick's chief cash crop. As in Prince Edward Island, great attention is given to potatoes. Production has increased greatly due to the use of fertilizers, insecticides, and modern machinery. A mechanical potato digger can lay bare 2000 barrels of potatoes in a single day. Most farmers in the Upper St. John Valley keep woodlots which supply a steady source of income.

Central and Northern New Brunswick

This large, forested, almost empty area lies east and north of the St. John Valley. Here the climate is more severe than at Grand Falls. Study Figure 5-2. Notice that this is one of the unpopulated regions of the Atlantic Provinces. In the northern sections, most of the people speak French. Other parts of New Brunswick also contain large numbers of French Canadians. It is possible that, soon, New Brunswick will become Canada's second French-speaking province.



5—59 Loggers on a river in Central New Brunswick (New Brunswick Travel Bureau photo)

Most of Central New Brunswick consists of a plateau that averages 2000 feet above sea level with occasional hills rising above the plateau to elevations of about 2500 feet. What is the highest elevation in the region as shown in Figure 5-3? Notice that the area to the northwest is of generally lower elevation. What kind of land is found there?

Forests supply the chief wealth of the region. Mills such as those at Edmundston receive most of their logs from these forests. What are the men in Figure 5-59 doing? Pulp and paper is an important product at a number of centres besides Edmundston. Name these centres, according to Figures 5-4 and 5-60.

Earlier, we mentioned that New Brunswick's forests produce much less wealth than they used to. Steps are being taken to improve matters. There are 14,000,000 acres of forestland and it is thought that an average of half a cord of wood can be produced from each acre each year. At present much less than this amount is being produced. A government booklet states that five things must be done if New Brunswick is to get the maximum wealth from its forests. From your studies in other chapters, what advice would *you* give to the boys and girls of New Brunswick to help them to preserve their forests?

How do the railway and road maps help to explain why Central New Brunswick is thinly populated? How do they help to explain why a lumber industry is difficult to establish in many places?

Due to the poor soils and the short growing season, there is very little farming carried on in the region. The tourist industry is based on the fish and game that thrive in the rivers and forests of the region. Each year thousands of fishermen and hunters from the United States and other Canadian provinces visit the area. Deer and the famous

Atlantic salmon are eagerly sought. Deer have been in great abundance for many years and in some areas greatly outnumber the human population. The chief salmon river is the Miramichi. In a recent year, 200,000 pounds (100 tons) of Atlantic salmon were caught by sportsmen in this river alone. However, the numbers of these fish have declined greatly during the past 50 years or more. The clearing of forests has caused streams in which the salmon breed to "silt up." Many streams have become polluted as a result of the discharge of sewage and waste products from mills. Today active steps are being taken to restore the Atlantic salmon. Young salmon are being produced in government hatcheries. "Fishways" are being constructed around power dams and other obstacles in the rivers.

Eastern New Brunswick

The forest and the sea are keys to understanding eastern New Brunswick. According to Figure 5-3, what kind of land makes up most of this region of the province? Like so much of New Brunswick, it is covered with both coniferous and mixed forest. The "mixed" stands, containing coniferous and deciduous trees, are part of the Acadian Forest found throughout the Atlantic Provinces. Bathurst, Chatham, and Newcastle are important centres of sawmilling and pulp and paper.

According to Figure 5-26, what are the main catches along New Brunswick's eastern shore? Describe the population distribution of the region, as it appears in Figure 5-2. Bathurst is a mining centre where important deposits of lead and zinc have been extracted in recent years.

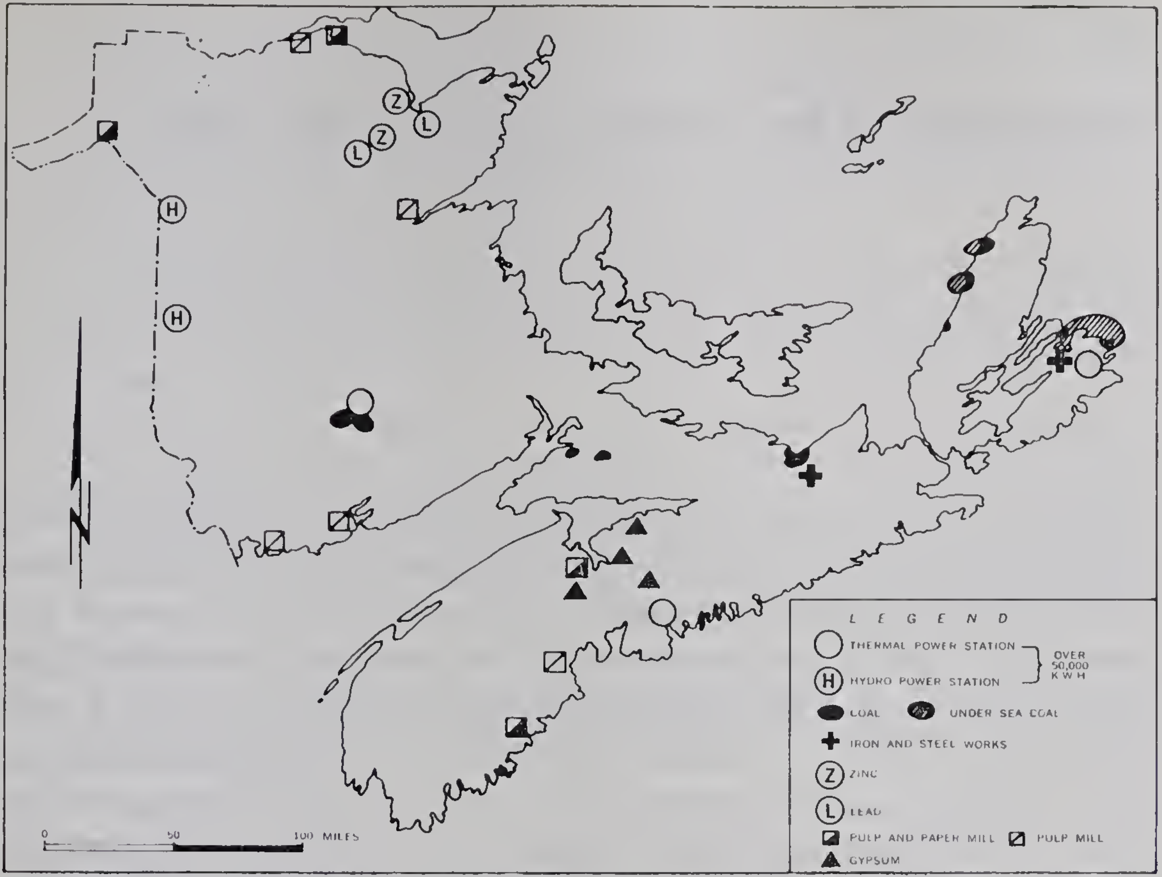
The Atlantic Provinces

1. This table shows how some of the people of New Brunswick earned their living in 1959 and 1960. (Numbers for forest industries were not obtainable. Numbers for 1960 are preliminary estimates from **Canada Year Book**, 1961.)

	1959	1960p
Manufacturing	20,927	22,267
Forest industries	—	—
Agriculture	—	12,727
Fishing	6,211	6,012
Mining	1,733	1,649

For each group list the products and the regions and cities where the work is carried on.

At the beginning of this chapter several questions were asked about this major region of Canada. Select each of the Atlantic Provinces in turn and try to answer these questions as they apply to the particular province.



5—60 Mineral resources, power, and certain industries of the Maritime Provinces. The hydro power stations are near New Brunswick's western border on the St. John River.

2. Explain why:
(a) Newfoundland has so little farmland.
(b) Labrador has so few people.
(c) Newfoundland and New Brunswick have 90% of the water-power resources of the region.
(d) most of Nova Scotia's electricity is produced from thermal power.
(e) the region is isolated from southern Ontario and Quebec.
(f) Southern Ontario uses coal from the United States instead of from the Atlantic Provinces.
(g) the Nova Scotia coal industry has been in steady decline for the past 20 years.
(h) lumbering and shipbuilding declined greatly in importance in the Atlantic Provinces between 1850 and 1900.
(i) the ports of the region remain open in winter while Quebec and Montreal are closed.
(j) the fishing industry has remained important in this region for nearly 400 years.

3. Study Figure 5—60 which shows the location of leading minerals, major power resources, and certain other industries of the Maritime Provinces.
(a) Account for the location of the two major hydro-electric power developments in New Brunswick.
(b) Account for the location of a major thermal power station in the same province.
(c) Which iron and steel development in Nova Scotia produces primary iron and steel?
(d) How does the map illustrate the importance of New Brunswick's forests?
(e) What are the leading minerals of the Maritime Provinces besides coal? Name the leading centres of production of each.
(f) What conclusion do you draw from this map about the resources, industries, and occupations of Prince Edward Island?

CHAPTER 6

Manitoba: The Legacy of an Ice Age

Manitoba is a province of contrasts. No province has greater extremes of temperature. It is in the very centre of Canada and yet it has a seaport. It has some of the most fertile soil in the world and some of the most barren, rocky land in Canada. The great Ice Age robbed the north of its soil, but provided the south with a deep, rich, black soil. Manitoba has some of Canada's greatest forests as well as flat, almost treeless plains. As the traveller flies over Winnipeg, it glitters like a jewel in the sparkling winter night. Here live half the people of Manitoba. Yet the northern part of the province is almost empty.

Manitoba is a fascinating province in the very heart of North America. What does it contribute to Canada? What is it like to live there? Why is Winnipeg the biggest city between Toronto and Vancouver? This chapter may help to answer these questions.

Here is a record of living conditions of a typical Winnipegger around the year:

> **October to March:** On Thanksgiving Day, or just before, leaves are swept up from the lawn. They all fall quite suddenly during the last week of September. Screens are removed from both back and front doors and from all the windows and replaced by storm windows. Throughout the winter, double glass windows protect all rooms. Very strong antifreeze is put into the radiator of the car, so that it remains liquid even in temperatures as low as 45 degrees below zero. Plastic windows or frost shields are stuck inside the windows of the car, at the front, side, and back. These windows leave an air space between the transparent plastic and the glass window. A garage mechanic tests the car heating system and puts in a special heavy duty battery. He also puts on snow tires and fixes the block heater. The block heater is an electric heater inserted into the oil sump of the engine. This is connected to an electric plug in the garage or on the wall of a parking lot when the car is stationary. It prevents the engine oil from freezing solid.
>
> Policemen in Winnipeg in winter wear thick fur hats, long buffalo-skin overcoats and heavy, fur-lined overshoes into which they tuck tightly the cuffs of their trousers. Children wear parkas, fur hats, ski pants, and heavy overshoes. Men and women similarly wear fur hats, very warm furs or outdoor coats. The clothes are not waterproof, because no one ever gets wet outdoors from the beginning of November until the end of March.

Driving a car is easy because the roads are rarely blocked by snow, even though snow often falls. It usually comes down in small particles, sometimes as fine as individual crystals. The snow is very powdery and blows about like fine dust. It does not pack down on the road, even under heavy pressure. It is impossible to make a good snowball, because one must wear thick gloves and because it is so difficult to bind the powdery snow. Not a great deal of snow falls, and the wind sweeps the snow from the roads.

When traffic lights turn green, the accelerating cars cause quite a temporary fog from the exhaust fumes, making it difficult for cars behind to see. People who wear spectacles, find that their glasses mist up immediately they go indoors.

Nobody skis in Winnipeg because the land is absolutely flat. It is a three-hour train journey to get to the nearest hills, southwest of Winnipeg. Skating, hockey, and curling are very common sports.

All outdoor farm work ceases for the five winter months. Lakes and streams freeze up. Luckily, many rivers and lakes are wide and deep. Fishermen put up tents on the ice on Lake Winnipeg and cut holes through which to fish. The Winnipeg River, which flows from the many deep lakes in the rocky hill country east of Winnipeg, is a constant source of electric power, for there is always a large volume of water flowing under the ice to the turbines at Great Falls and elsewhere.

The Winnipeggers maintain their normal daily lives throughout a very severe winter. They go to work in factories, businesses, and schools, just as people do in other parts of Canada.

April, May, and June: April is an unpleasant month. It is wet and dirty by day, freezes up at night and then thaws again. Finally, it thaws very fast and by the end of the month it is often hot (sometimes up to 90°F.), dry, and dusty. The farmers hurry to sow their grain as soon as it is possible to work on the land, but real growth doesn't start until May. Until that month, leaves do not appear and flowers do not blossom. June is a grand month. It is warm and everything grows lusciously. It sometimes rains, is not usually oppressively hot, and the mosquitoes haven't arrived. At the beginning of May, the householder takes down his storm windows and puts up screen windows. He removes the frost-shield plastic windows from the car and has heavier oil put in the engine.

July, August, and September: July and August are very hot. A few thunder showers cool the air, but many city folk try to get away for a week or two, to a summer cottage on a cool, crystal lake east of Winnipeg. Here they relax under shady trees in an area called the Canadian Shield. Over the wide flat prairie, the sun shines pitilessly on a land where shade trees are few and where enormous expanses of grain ripple in the breeze. In September, the weather cools quite suddenly and, by the middle of that month, frost occurs and the leaves begin to fall again.

Climate and life in Winnipeg

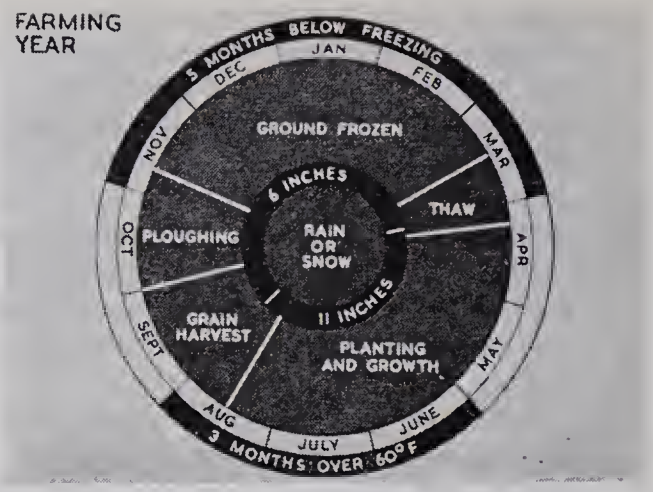
1. (a) Why does the typical Winnipegger have screens on his house in summer and storm windows in winter? Why do the leaves fall so suddenly and early in September?

(b) Why does he take so much trouble with his car in the autumn?

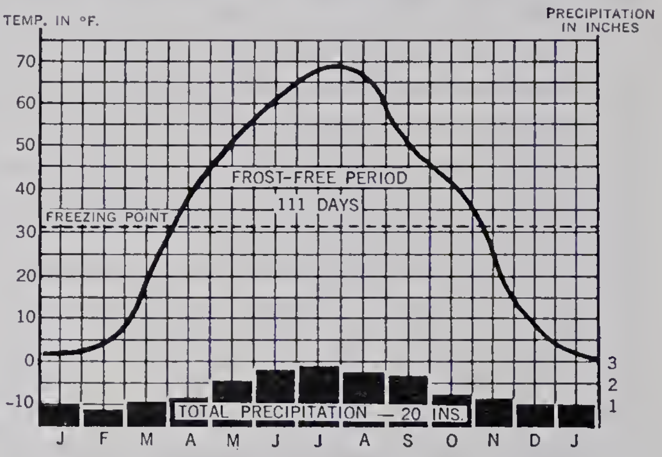
(c) Describe the special clothing necessary during a Winnipeg winter. Why is waterproof clothing seldom necessary during this season?

(d) Describe driving conditions faced by Winnipeggers during the winter.

6—1 Diagram of the farming year in Southern Manitoba (Common Ground study photo)



6—2 Climatic graph of Winnipeg



Date of last frost	May 27	Record low temp.	—54°F.
Date of first frost	Sept. 15	Total annual snowfall	49″
Mean annual highest temp.	96°F.	Prevailing winds	NW
Mean annual lowest temp.	—35°F.	Hours of sunshine	2124
Record high temp.	108°F.		

6—2a Additional climatic data of Winnipeg

(e) Why do the roads remain more free of snow in winter than in such eastern cities as Montreal and Ottawa? In what ways is the snow different from that which falls in some other parts of Canada?

(f) Which sports are popular at Winnipeg in winter? Why is skiing **not** carried on near the city?

(g) Why is it fortunate that the lakes of Manitoba are generally quite deep?

(h) Why is the winter so bright and cheerful, despite the very cold conditions?

2. (a) Why are April and May unpleasant months? How do they compare with May in your home region?

(b) Why do people try to get away from Winnipeg in mid-summer?

3. Figure 6—1 is a chart showing the farming year in an area west of Winnipeg. Figure 6—2 is a climatic graph of Winnipeg.

(a) Compare the number of months with average temperatures below freezing with the number in your neighborhood.

(b) During which period is the ground frozen? When does thawing begin?

(c) How many months at Winnipeg have average temperatures above 60°F.? Compare the July average here with that for your neighborhood.

(d) What is the frost-free season at Winnipeg? Compare this with the season at St. Catharines, Ontario (Figure 2—16). Plants receive more hours of sunlight at Winnipeg in July, than at St. Catharines. Why is this?
(e) In an average January, Winnipeg receives 100 hours of bright sunshine, while Vancouver receives only 48 hours. How do you explain this fact? (For information on the climate of Vancouver see page 381.)
(f) When does most of the annual precipitation occur in Southern Manitoba? Why is this a particularly suitable time?
(g) What is the total annual precipitation at Winnipeg? Compare this with the total in your neighborhood. Compare it with the total for Regina and Saskatoon. (See pages 299 and 309). What conclusions do you draw about precipitation of the eastern prairies compared with those of the central (Saskatchewan) prairies? What proportion of Winnipeg's precipitation occurs during the months of May to August inclusive?
(h) Winnipeg receives a total of 49 inches of snowfall. Compare this with the total in your neighborhood. Compare it with the total for Montreal (page 157). Although winters in Winnipeg are considerably colder than in Montreal, in what way would conditions be easier? Why?
(i) Describe farming activities during the period from mid-August to September, according to Figure 6—1.

The conditions described so far represent typical climatic conditions at Winnipeg. What is the annual range of temperature here? It is evident that Winnipeg has an extreme climate. The most extreme weather ever experienced is indicated underneath Figure 6-2. These exceptional conditions cause great concern to people in Manitoba. Thus, on June 7, 1961, a Winnipeg newspaper reported that the temperature the previous day had soared to a record-breaking 91.8°, a new record for that date. The newspaper added:*

> The city is also choking from a near record dry spell. Wednesday was the city's twenty-eighth day without rain — the longest spell since 1917, and the third longest since records have been kept. The longest rainless period was 32 days in 1917. The second longest, 29, was in 1894. Hot, dry weather has prevailed throughout the prairies this month and several other western Canadian cities recorded high temperature records on Tuesday.

On July 11 of the same year, the newspapers reported a temperature of 103°F. at Winnipeg. At Emerson, farther south, the temperature reached 112°F. The hottest day ever experienced in Winnipeg was on July 11, 1936, when the mercury reached 108.2°F. That year, too, was very dry, but the spell was broken when a thunderstorm dropped one and one half inches of rain on the city in less than half an hour. Roofs were blown off buildings, windows were smashed, powerlines knocked down, and radio broadcasting interrupted. Even the city hall clock stopped when the tower was struck by lightning.

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*Material quoted here has been provided through the courtesy of the Winnipeg *Free Press*.

However, as they surveyed the damage, city residents heaved a sigh of relief, for one of the driest spells and the most intense heat wave in Winnipeg's history were over.

Referring again to 1961, on July 14th the Winnipeg newspapers reported that the previous week's rainfall had prevented a total crop failure in many Manitoba districts. However, the crops could still deteriorate rapidly if the dry weather returned. One report stated:

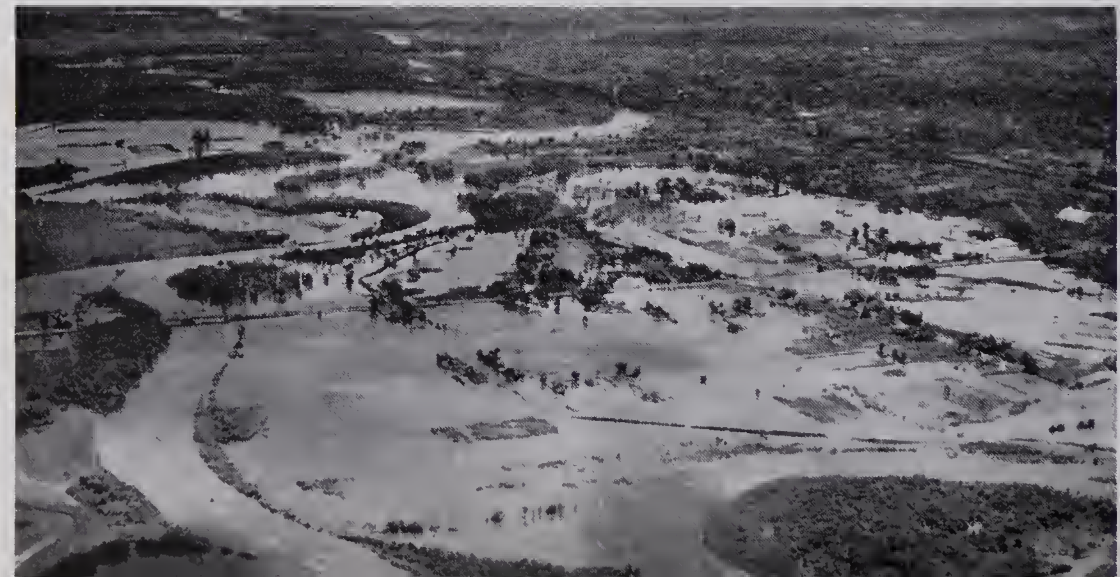
> The heaviest rain in the past 72 hours was recorded in Hamiota, Portage la Prairie, and Winnipeg. The weather office in Winnipeg said Friday that rainfall ranging from 2.49 inches to just a trace had fallen over Manitoba in the past 72 hours. Winnipeg received one of the heaviest rainfalls with 2.34 inches in the period.

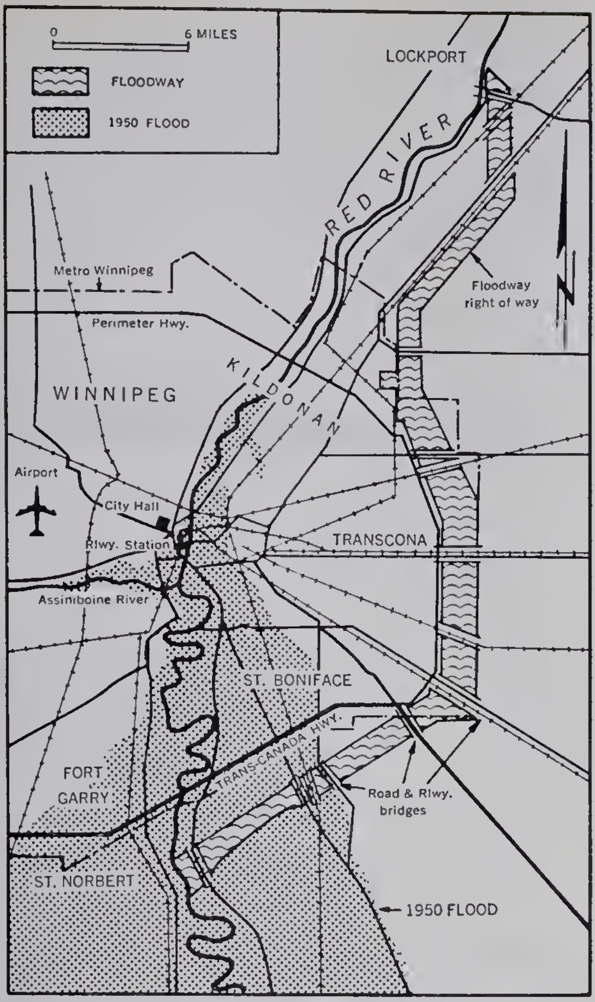
The drought in July 1961 was very severe and caused many people to compare it with the great drought of the 1930s, which, together with a disastrous fall in wheat prices, left many farmers bankrupt. So severe were the droughts in the early thirties, that cattle died and crops were ruined, causing the period to be referred to as the "dirty thirties."

These stories all stress the fact that, in addition to the severity of winter and the heat of the summer, the prairies of Canada sometimes suffer extremes of drought and rain.

Manitobans must sometimes face the danger of floods, which may be caused by a torrential summer downpour or a very rapid thaw in March and April. If this rapid thaw is accompanied by heavy rains in the Dakotas, the Red River may rise and threaten to engulf the whole of Winnipeg. This danger is very much increased by the flat nature of the ground throughout much of Southern Manitoba. Figure 6-3 shows the flood scene on the Assiniboine around Brandon, in July, 1954. If the rivers rise above their banks, the water is free to flow for miles on either side.

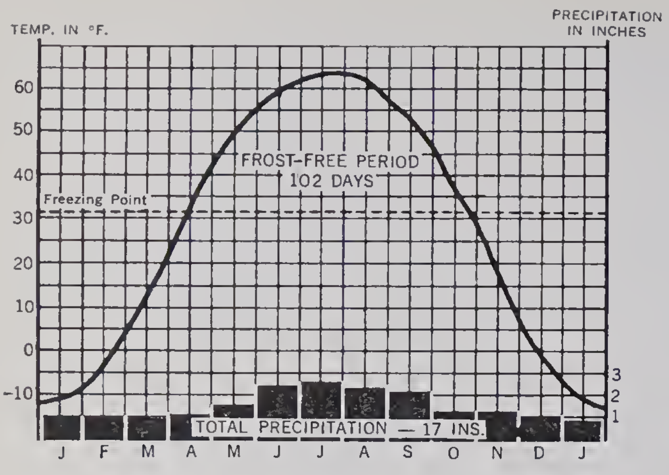
6—3 Flood scene on the Assiniboine River near Brandon in July, 1954 (P.F.R.A. photo)





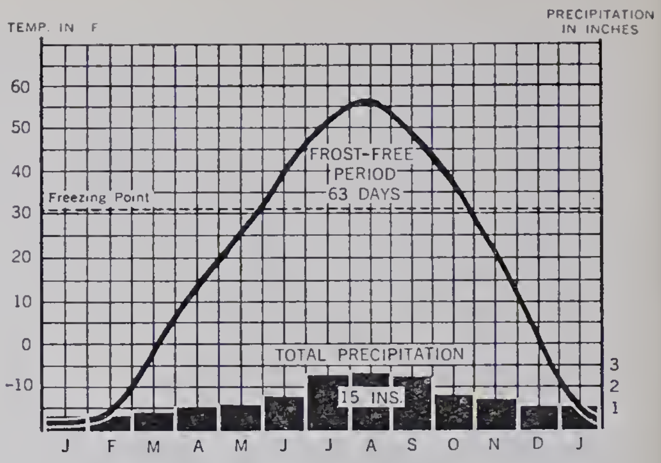
6—4 The Red River "floodway" at Winnipeg (after **Time** magazine)

In 1950, one of the worst floods in its history occurred at Winnipeg. So great was the disaster that money came in from all over the world to help those who suffered losses. So disturbing was it that the Manitoba Government, with the aid of the Federal Government, is building what they call "The Big Ditch" around Winnipeg. Figure 6-4 shows the flood area and the ditch or "floodway" that is intended to save the city from future disaster. This big ditch will be 30 miles long, up to 35 feet deep, and between 800 and 1000 feet wide. It will not carry shipping, irrigate land, or generate electric power, and may remain dry for 11 months of the year. The cost ($64,000,000) is simply an insurance policy against a repetition of the 1950 Red River flood that caused damage exceeding $100,000,000, inundating 2000 farms, 7000 homes, and nearly one third of Winnipeg. This flood, which was greater than any that had occurred since 1852, was caused by a combination of deep winter snow, late thawing, and heavy spring rains in the Dakotas. The floodway is the biggest excavation job in Canadian history, and will require the removal of more material than was dredged for the St. Lawrence Seaway. Study Figure 6-4. Where was the main flood area in the Red River Valley in 1950? Describe the location of the proposed floodway.



6—5 Climatic graph of The Pas

Date of last frost	May 30
Date of first frost	Sept. 9
Mean annual highest temp.	92°F.
Mean annual lowest temp.	—41°F.
Record high temp.	100°F.
Record low temp.	—54°F.
Total annual snowfall	53″
Prevailing winds	NW
Hours of sunshine	2059



6—6 Climatic graph of Churchill

Date of last frost	June 28
Date of first frost	August 30
Mean annual highest temp.	86°F.
Mean annual lowest temp.	—42°F.
Record high temp.	96°F.
Record low temp.	—57°F.
Total annual snowfall	55″
Prevailing wind	NW
Hours of sunshine	1500

It is obvious that there are obstacles to life on the prairies, and yet with their ingenious inventions for reaping, snow-clearing, and food preservation, for bringing water great distances from the lakes and power from the waterfalls, men have overcome many of the difficulties that once afflicted the inhabitants of this region. With central heating, refrigeration, air conditioning, snow ploughs, snow tires, specially devised clothing, and lakeside holiday resorts, Manitobans enjoy a life very similar to that of others who live in the more moderate climates of Canada's west coast.

Further studies of the climate of Manitoba

1. What are the main problems that great extremes of climate bring to the people of Manitoba?
2. Figures 6—5 and 6—6 provide information about conditions in other parts of Manitoba. Locate these places in Figure 6—7.
(a) What changes do you note in the average January temperature as one goes from south to north in Manitoba? What changes are noticeable in the July temperatures?

6—7 (opposite) Physiographic diagram of Manitoba*

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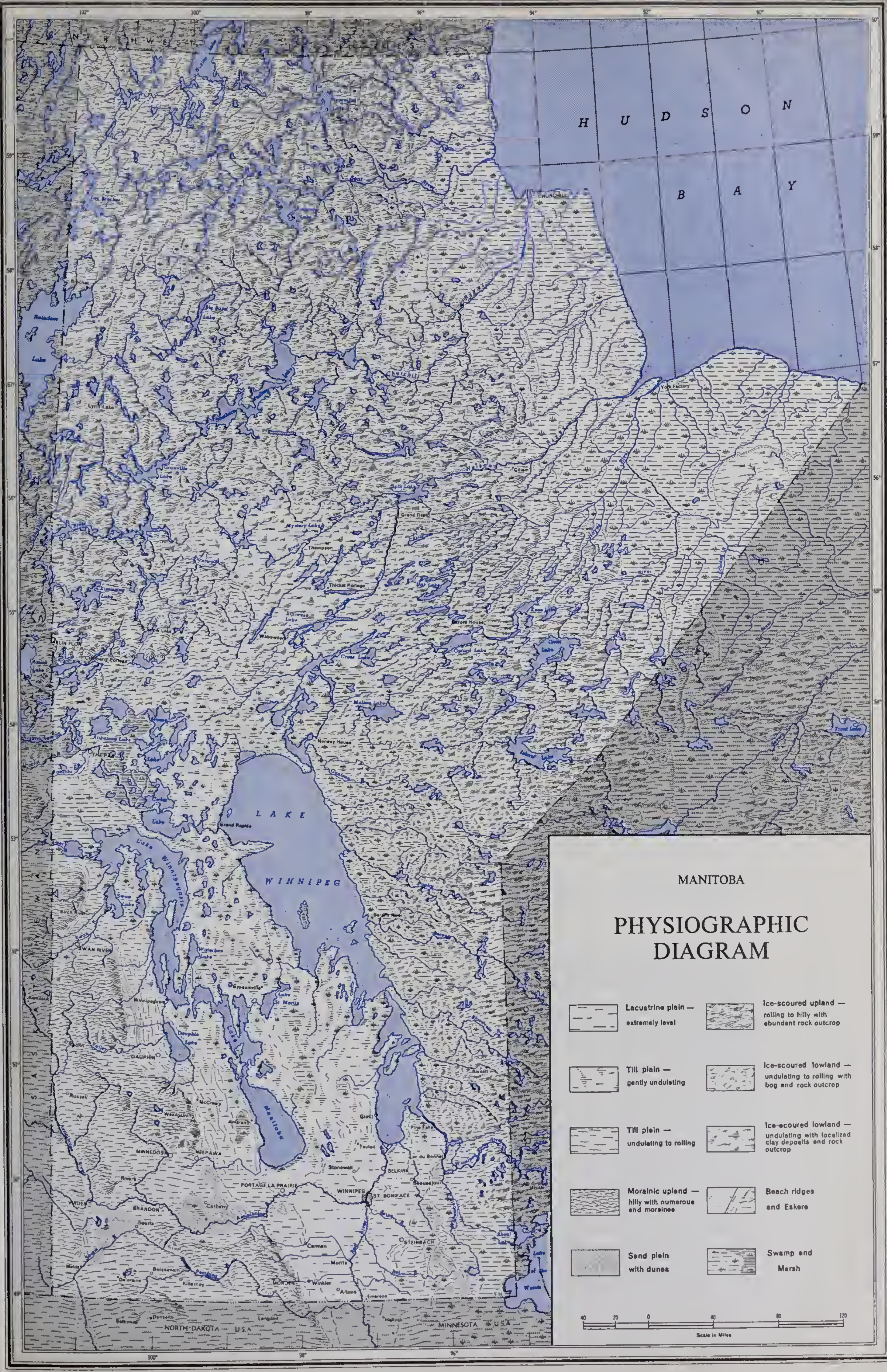
*Physiography is a description of the land surface of the earth. This physiographic diagram is not a true map, but tries to give an impression of what the surface of Manitoba looks like. It is from the *Economic Atlas of Manitoba* and is reproduced here with the kind permission of the Department of Industry and Commerce of the Manitoba Government.



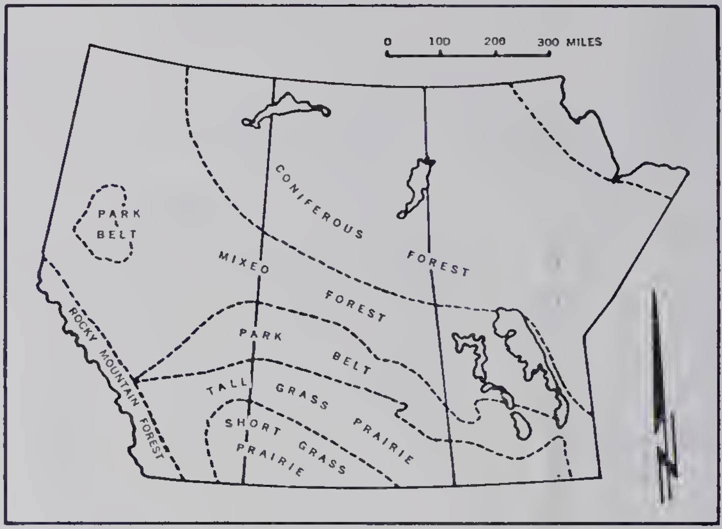
MANITOBA

PHYSIOGRAPHIC DIAGRAM

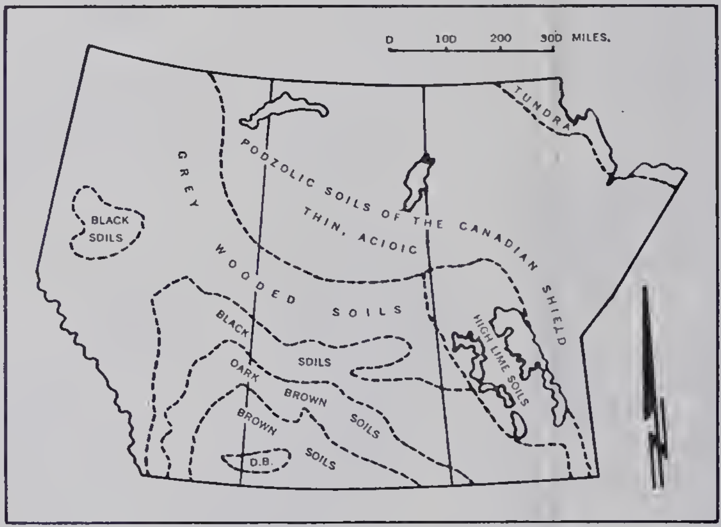
(b) What do the figures tell you about the change in the length of the growing season?

(c) What do the graphs suggest about the precipitation in the various parts of Manitoba?

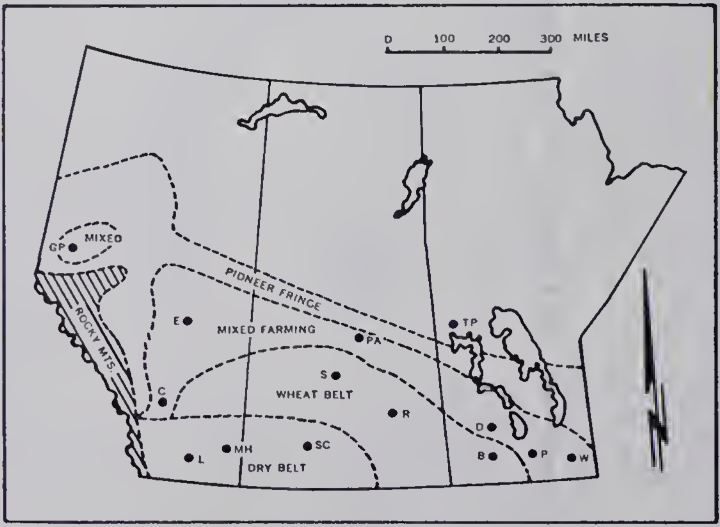
3. Refer to Figure 8—11 on page 337 for further information about climatic variations in Manitoba. Compare general conditions with those of the other Prairie Provinces.



6—8 Vegetation belts of the Prairie Provinces



6—9 Soil zones of the Prairie Provinces



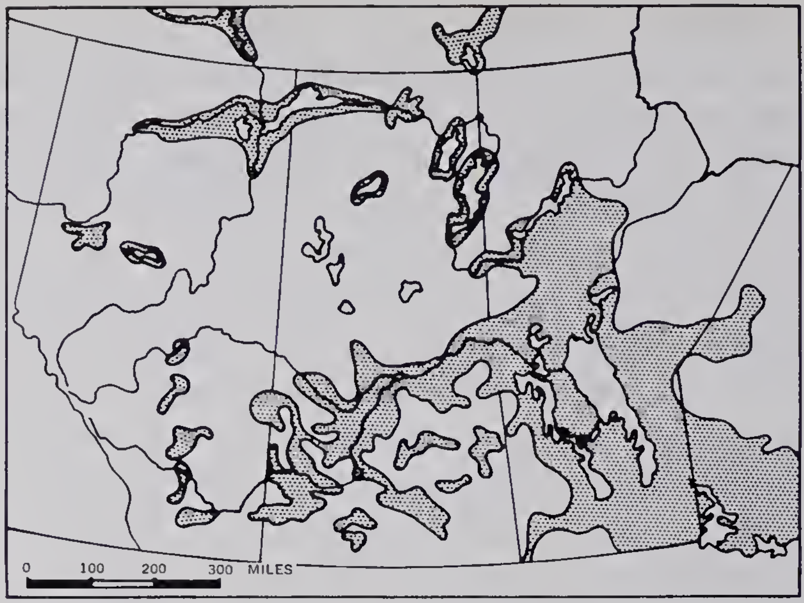
6—10 Agricultural regions of the Prairies. Identify the cities that have been indicated by their initial letters.

Climatic conditions are so severe in northern Manitoba that farming gives way to forestry and mining. Eventually, even the forests thin out and only barren tundra remains. Figures 6-37 and 6-35 show forest and tundra scenery in this region. Refer to Figure 6-8. How many vegetation belts may be identified on this map? Which one is found only in Manitoba? How does this map suggest that "prairie" is a poor term to apply to the whole of Manitoba? Fort Churchill in the tundra region is actually south of Bergen in Norway and Anchorage in Alaska, where the harbors are never frozen over. That at Churchill is open scarcely three months of the year. Why is this so? Find the latitudes of Churchill, Bergen, and Anchorage on a world map.

Figure 6-9 indicates seven different types of soil in the Prairie Provinces. How many of these are represented in Manitoba? How do the soils of the northern part of the province compare with those of the south? These soil zones are closely related to agricultural zones. In Figure 6-10, note two kinds of farming that are important in Southern Manitoba. This is a very simplified map, for, as we shall see later, there are actually many different types of farms in this part of the province. Locate the area labelled "pioneer fringe." This is where new land is still being opened for farming. Which province has the largest area of pioneer farming? Refer to Figure 7-18 in Chapter 7 for a view of these pioneer lands in the Prairie Provinces.

Our discussion of climate and of vegetation, soil, and agricultural maps has shown that there is a very great difference between northern and southern Manitoba. What are the main differences? In Figure 6-25, the extent of the Canadian Shield is shown. From your studies of this great region in Chapters 3 and 4, and from the photographs in Figures 6-35, 6-37 and 6-38 describe the general appearance of northern Manitoba.

Figure 6-7 is called a physiographic diagram of the province. It shows that sharp contrasts in relief are uncommon. The highest point in Manitoba is 2727 feet above sea level. Compare this with the highest point in your province. What indication is there that the three largest lakes were once much larger than they are now? Figure 6-11 shows that thousands of years ago, after the last Ice Age, *most* of Manitoba was under water. Which part of the province — the northern or the southern part — contains most of the lakes? On the small scale of Figure 6-7, only a very few lakes can be shown. Figure 6-36 shows part of the area around Churchill with its many thousands of lakes. What evidence is there in Figure 6-7 that the land of Manitoba slopes gently to the northeast? How can you tell that Hudson Bay was once



6—11 Areas covered by glacial lakes in the Prairie Provinces. How much of Southern Manitoba was under water?

larger in extent? Study the legend of the diagram. "Lacustrine" refers to the material deposited by lakes. Where is the chief area of lacustrine plains in Manitoba? Figure 6-23 shows what such a plain looks like. Name some materials deposited by glaciers in Manitoba. Where are most of these materials found?

Figure 6-12 shows a population map of Southern Manitoba. The line separating the sparsely populated from the heavily populated areas divides the province into northern and southern parts. All over Southern Manitoba, the population is evenly spread except for the big concentration at and near Winnipeg. This densely settled area of the Red River Basin is the most fertile part of Southern Manitoba.

It is now necessary to study the two great divisions of Manitoba in detail. As we do so, it will be helpful to refer to Figure 6-7.

SOUTHERN MANITOBA: FERTILE LAND WITH A GREAT CITY

About 55 miles due west of Winnipeg and six miles due west of Portage la Prairie is a farm owned by Mr. J. L. Faurschou. Figure 6-13 shows a detailed map of the main farm. There are two other parts to this farm: the Adam Quarter, located directly south of the home farm, and the High Bluff Land, located more than ten miles away to the northeast. What do you notice about how the land seems to be divided in this part of the prairies?

Land and life on a Manitoba grain farm

1. Figure 6—14 is a map of a prairie township, divided according to the square survey pattern seen on the map of Mr. Faurschou's farm.*

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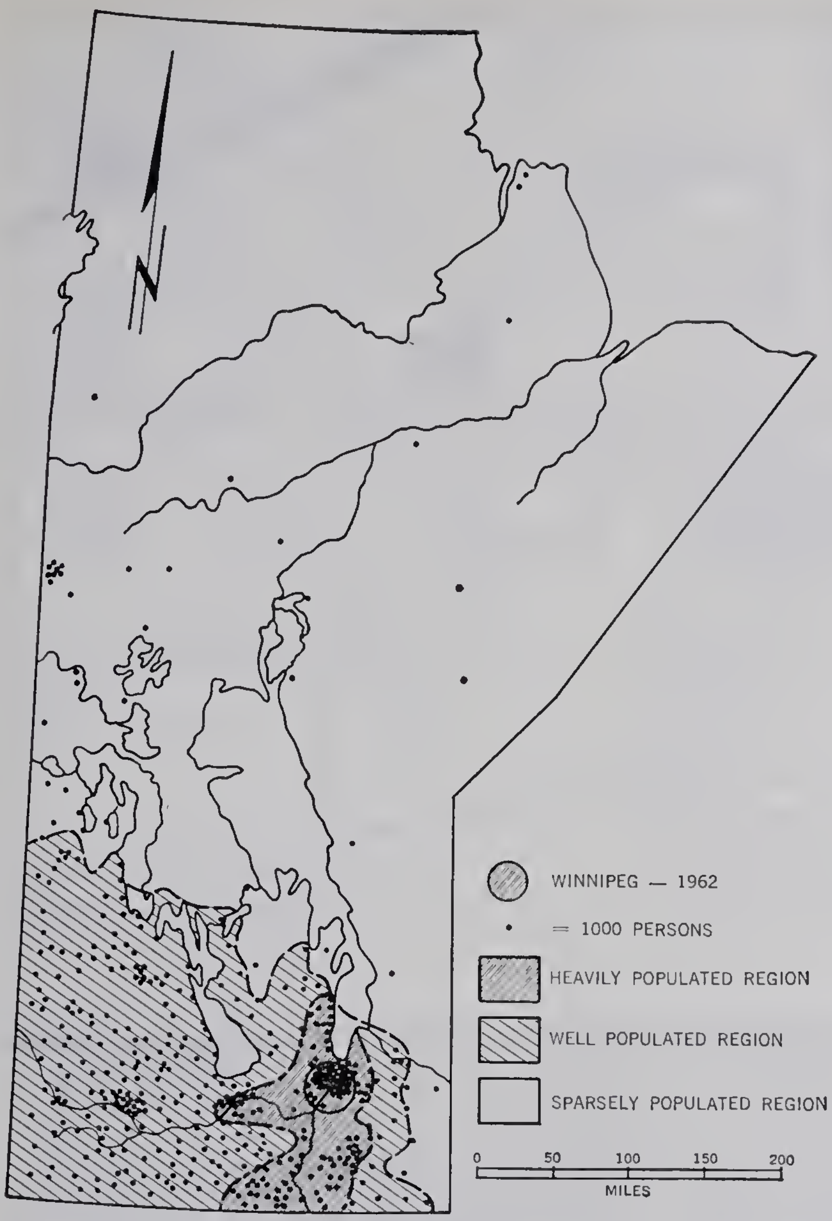
*This system of land division was established before much settlement had taken place. The numbering system (see exercise below) made it easy for settlers to locate their lands. For these reasons, settlement was peaceful and orderly. Each section consisted of 640 acres (one square mile) and was subdivided into quarter sections of 160 acres each.



6—12 The distribution of population in Southern Manitoba

(a) What are the dimensions and area of a prairie township?

(b) Townships are divided into sections, as shown on the map. How many sections make up a township? What are the dimensions of a section? Note the numbering system used for the sections.

(c) The Hudson's Bay Company, which once owned most of the land on the prairies, was allowed to retain part of each township. What was the total area of land retained by the company, according to this map?

(d) To encourage railway building, grants of land were made to the railways. How many square miles of land were set aside for this purpose in this section?

(e) How much land was set aside for school purposes? Revenue from such land helped to build the first schools and pay the teachers.

(f) Why was this system of land division especially easy to use on the prairies?

2. Figure 6—15 shows a picture of the Faurschou house and farm buildings, taken during the month of March.*

(a) How deep is the snow in this photograph?

(b) Describe the relief of the land.

(c) What purpose do the trees serve on this farm?

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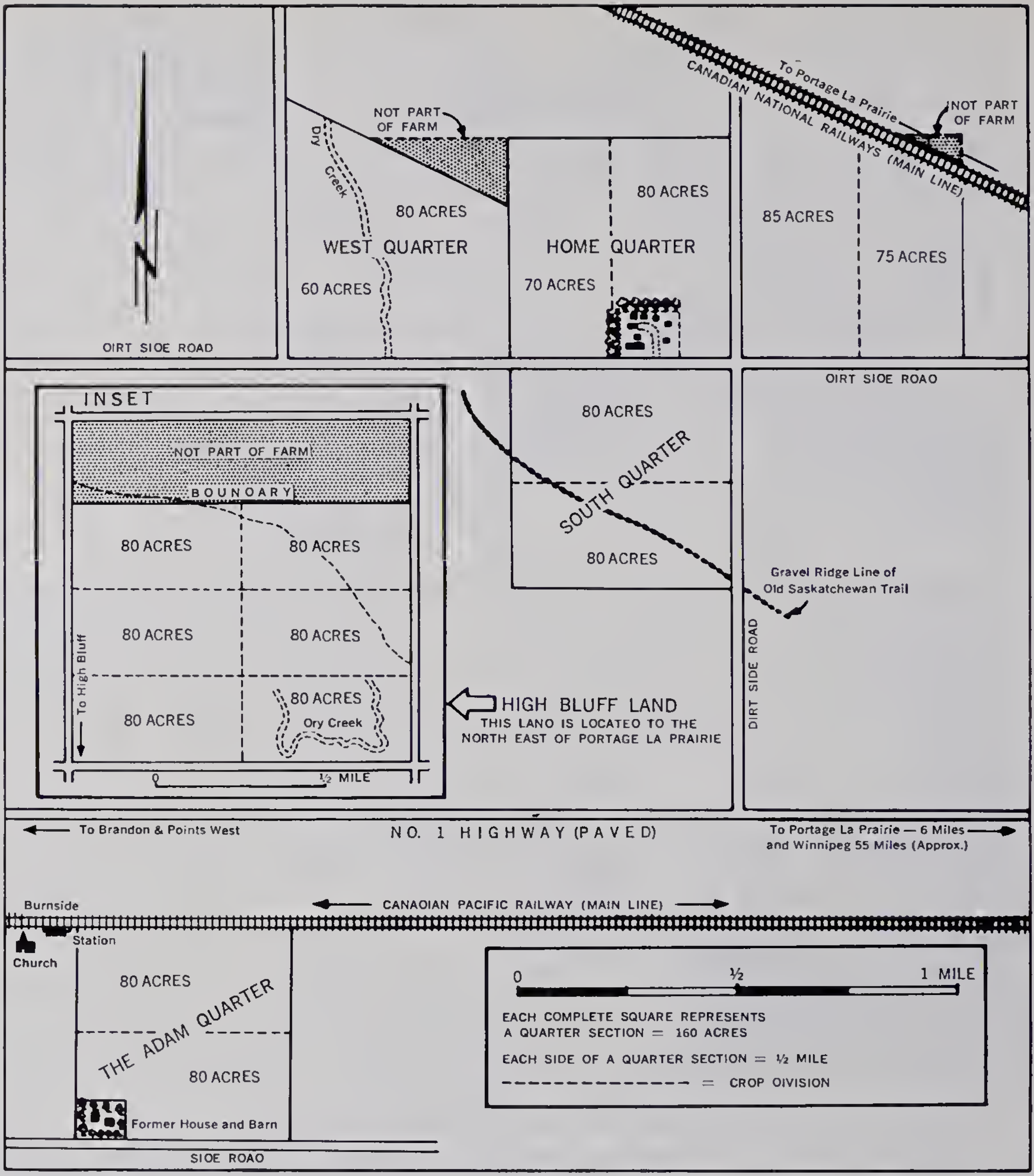
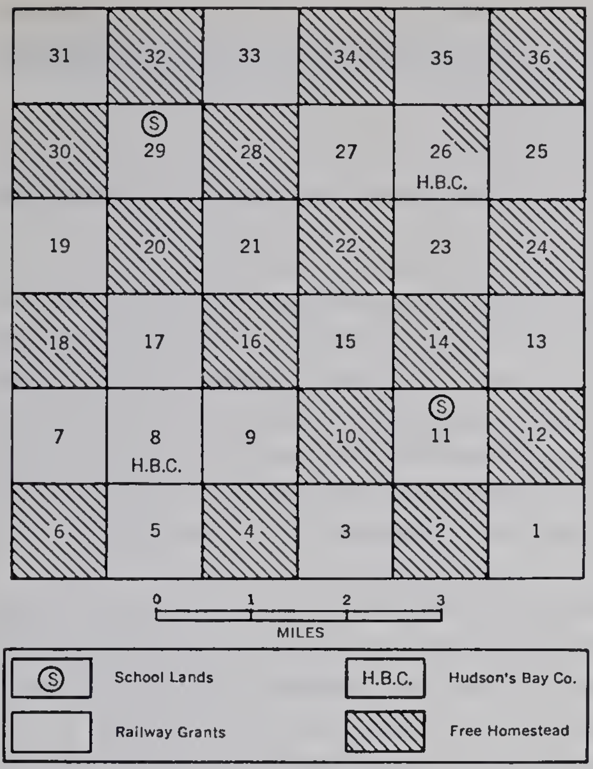
*The material on the Faurschou farm is based on field work done by Miss Joan Bostock and has been provided through the courtesy of the author and the Association of Agriculture of Great Britain.

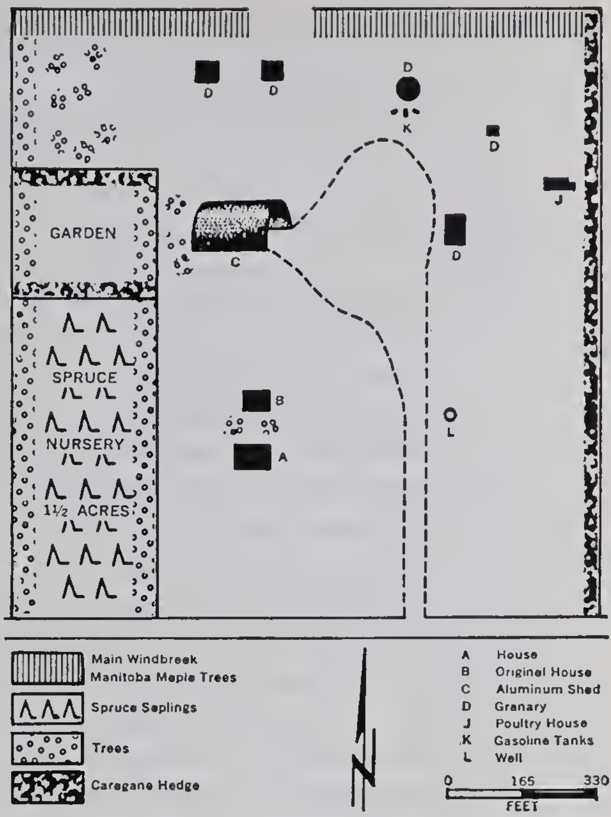


6—13 Map of the Faurschou Farm. Note that the inset of the High Bluff Land is of land a few miles to the northeast of the main farmland.

3. (a) Match the photographs with the maps in Figure 6—13 and 6—16.
(b) What kinds of trees grow around the buildings? Caragana (sometimes spelled with a "k") originally came from Siberia. It grows quickly and makes an effective barrier to wind. Caragana grows well in dry conditions.
(c) How many buildings are used to store grain?
(d) How many acres of land does Mr. Faurschou own in total? Describe the area of his farm in square miles. Compare it with the size of an average farm in your neighborhood.
4. Figure 6—17 shows Mr. Faurschou's house and, behind it, the house in which his son and daughter-in-law live.
(a) What difference do you notice between this photograph and Figure 6—15?
(b) What similarity do you notice in weather conditions between the two photographs?



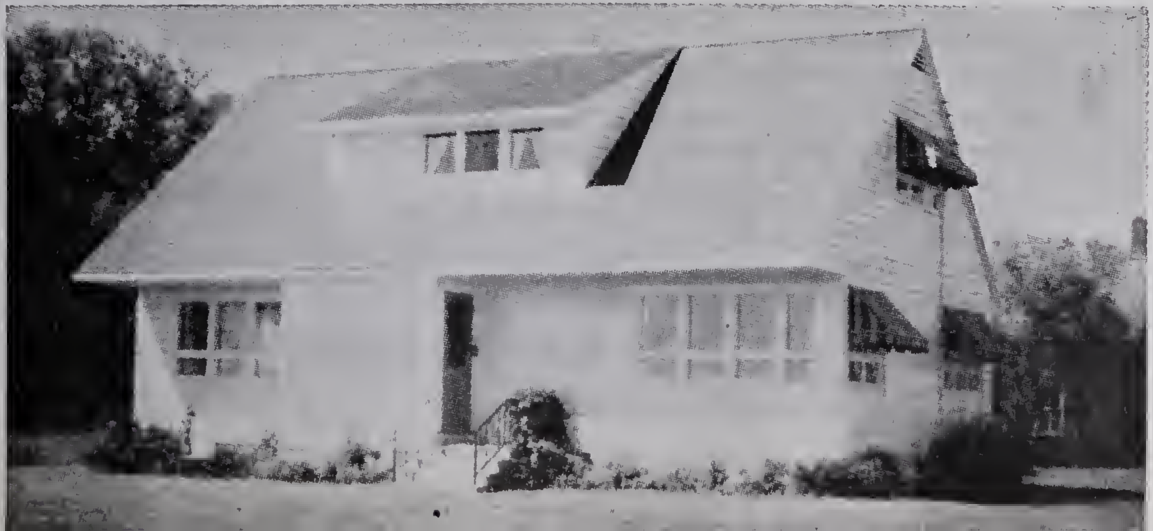
6—14 How lands were allocated in a typical prairie township (after Professor Trevor Lloyd)



6—16 Map of the Faurschou homestead (after Joan Bostock)

6—15 (below) The Faurschou homestead under snow (Association of Agriculture of Great Britain photo)

6—17 The Faurschou home facing south (Association of Agriculture of Great Britain photo)



(c) Which season of the year is shown in Figure 6—18? How can you tell that it is still very warm? Which features of the land of southern Manitoba can be seen in this photograph?
(d) Explain the term "Home Quarter."

The story of Mr. Faurschou's life tells a great deal about conditions of life all over the prairies.

Originally, he owned just the home farm but, by using more machinery, he has found it possible to cultivate additional areas. He acquired two other portions of land and is thus able to make a better living from a greater total acreage. The house and buildings are all on the home farm, which is the centre of operations. The farm, as with most on the prairies, has no specific name, being known either by its location on the survey or by the name of its owner. Mr. Faurschou bought the farm in 1946 and now operates it in partnership with his two sons, Ralph and Gerald.

When they first acquired this land, there was a barn on the home farm, and a certain number of livestock were kept. This barn has now been moved and the livestock sold. The farm has been turned over entirely to the production of crops. This might seem to reverse the trend towards mixed farming on the prairies, but the soil on the Faurschou farm is excellent for grain growing. It is thus better to produce a variety of grains than to keep animals. Mr. Faurschou specializes in the growing of seed wheat and he has to take particular care in cleaning and selling it. He grows very good crops of wheat which are in demand for seeding in other places. These crops include the famous "Selkirk" wheat and, recently, the new "Pembina" wheat. Canadian farmers have had to develop crops that are resistant to diseases such as rust and smut. On some farms where no animals are kept, the winter is a "slack" season, and many farmers take their vacations or temporarily move into nearby towns to take up some other form of work. Because they grow seed grain, the Faurschous have a busy time during the winter. They have installed an expensive grain-cleaning unit in a large weatherproof building. They spend the winter carefully cleaning the grain for sale to other farmers for the next year's seed time.

Mr. Faurschou came to Canada from Denmark when he was quite a young man. His wife, the daughter of an English doctor, has also been in Manitoba since she was a girl. In common with many British settlers, she came to Canada with her widowed mother, brothers, and sisters, just before the first world war, when the land was being opened up. Conditions at that time were startlingly different for a young English woman, used to a somewhat sheltered life in England, and Mrs. Faurschou soon found herself leading the life of a pioneer farmer in a strange land, in an isolated community with very few conveniences. Before long, however, she was raising turkeys, baking bread, bottling fruit, canning meat, and making soap.

Mr. and Mrs. Faurschou have become attached to the uninterrupted views and the almost treeless countryside in which they live. Everything is vast. The highways are incredible in their straightness. They seem to stretch away into space. On a perfectly flat prairie, the range of vision is rather like it is at sea, conforming to the height of observation and the curve of the earth. The Faurschous can see eight miles or more in each direction on a clear day in winter or summer.

A real monotony comes in winter when, for five months on end, the land is covered with snow in a huge white mantle, but much of this season is sunny and clear, and the snow gives it particular brightness. The area where the

Faurschou farm is located is called the Portage Plains and in the spring, when the countryside begins to come alive, the land has a particular beauty, when the sun is out and the sky is clear and blue. The surprising blackness of the rich soil makes a striking impression and contrasts sharply with the green of the growing crops, the grass along the roadsides, and the clumps of trees that have been planted. For a few months in summer, the land really comes into its own and it is an inspiring sight to see the endless acres of grain ready for the harvest. The growing season is one of feverish activity, especially in the spring when seeding takes place and in the fall when harvesting goes on almost around the clock.

On a farm such as this, where there is no stock, fences and hedges are not necessary. It should be remembered, however, that in many districts and on many farms on the prairies, barbed wire fences are an inevitable feature where livestock are kept. On the Faurschou farm, the huge fields merge into each other, the only real divisions coming at the roads.

The principal crop is wheat, but this is not for direct human consumption. As already noted, it is grown for seed. The basic rotation is two grain crops followed by a summer fallow.*

As soon as the land is fit to work in the spring, Mr. Faurschou begins the spring sowing. The first crops are sown in last year's summer fallow. The next job is to tackle the future summer fallow, in order to stimulate the growth of weeds that will later be ploughed under to enrich the soil.

Research has not yet produced a wheat that will survive the severe winter and then grow successfully during the summer. Experiments have concentrated, therefore, on producing a wheat that will grow to maturity in about 100 days, because that is about the length of time left for good growing.

As soon as the ground has thawed out about the middle of April, the short farming year may be said to have begun. Seeding time is in May. June, which can often be rainy, is looked on as the "growing month." Unless wheat is sown before the end of May, there is little chance of it coming to a proper harvest. Therefore, if the season is late, farmers may have to turn to other crops such as barley, oats, and flax seed, which are able to mature in a shorter growing season. Mr. Faurschou grows all these crops, as well as peas, in a typical year.

Because the summer is so hot, the rate of growth is very rapid. Weeds also grow fast and chemical spraying is necessary to control them. It is important to eliminate the weeds, since they use up the little moisture that is available. Harvesting starts towards the end of August and continues into September or even into October. A delay in harvesting until October is not serious, so long as the grain has matured before the first frost comes in the middle or at the end of September. Combine harvesters are used on the Faurschou farm, as on nearly all the prairie grain farms. First, the crop is cut with a swather. This cuts and lays the straw and grain in a "thatched" formation on a small height of stubble as shown in Figure 6—18. If there is good drying weather, three days will suffice to dry it out because the air can circulate freely through the stubble beneath. At this stage, the combine harvesters enter the field. The crop is picked up from the swaths and threshed as the combine goes along. The straw will all be left on the field and the grain blown out through a spiral

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*A summer fallow field is one in which no crop is being grown. Such a field must be carefully cultivated in order to conserve both soil and moisture. The fallow is necessary because there is not sufficient moisture in the soils to produce more than two crops every three years. In some areas, a summer fallow is necessary every alternate year. Good cultivation can conserve as much as four inches of moisture, which is carried over to the next year when a crop can be sown in the field.

6—18 Two combine harvesters at work in the West Quarter of the Faurschou home farm (Yosh Tashiro photo for Association of Agriculture of Great Britain)

> conveyor to accompanying trucks. The grain, now ready for storage, is driven to the yard and elevated into the different granaries. On a good day, it is not unusual for 35 or 40 acres to be combined by one machine alone.

Barley was introduced fairly recently into the prairies and Manitoba produces about 40 percent of the whole Canadian crop, mostly for feed. Flaxseed is another recent introduction into the prairies. Its cultivation is similar to that of wheat, but it can conveniently be left standing in the field for a long time, since the grain does not fall out even if it is picked up long after it has been cut. Flaxseed oil is called linseed oil and is used in the manufacture of paint, varnish, linoleum, and patent leather. It is also used as weatherproofing for raincoats and tarpaulins. The pulp left after the oil has been pressed out of the flaxseed is converted into linseed cake which is a high-protein cattle food.

Study the following summary of land use on the Faurschou farm in 1961:

HOME FARM
West Quarter: 60 acres of western portion, Marine Flax (sown June 14th, harvested in October).
80 acres of eastern portion, summer fallow.
Home Quarter: 6 acres of western portion summer fallow.
64 acres of western portion Arne Flax (sown May 25th).
30 acres of eastern portion Creamette peas (sown May 22nd, sold in eastern Canada for soup).
50 acres of eastern portion, Keystone Barley (May 20th).

East Quarter: 80 acres of western portion, Rodney oats and clover (sown May 23rd, oats harvested in September, clover in 1962).
80 acres of eastern portion, clover (cut and sold as feed in summer, fallow for rest of season).
South Quarter: 80 acres of northern portion, Selkirk Wheat (sown May 27th).
80 acres of southern portion, Pembina Wheat (sown June 3rd, matures in less than 100 days, yields 30 bushels to the acre, which is higher than Selkirk yields and requires less fertilizer).
ADAM QUARTER
115 acres of northern portion, Pembina Wheat (sown June 8th).
35 acres of southern portion, Pembina Wheat (sown June 6th).

HIGH BLUFF LAND
Western Half (from north to south):
80 acres of northern portion, grass and alfalfa (cut and baled for hay).
80 acres of central portion, Selkirk Wheat (sown May 31st).
80 acres of southern portion, Selkirk Wheat (sown June 5th).
Eastern Half (from north to south):
40 acres of west part of northern portion, grass (cut and baled over summer).
40 acres of east part of northern portion, Selkirk Wheat (sown May 29th).
80 acres of central portion, summer fallow.
80 acres of southern portion, Marine Flax (sown June 8th).

A further study of the Faurschou farm

1. (a) What proportion of Mr. Faurschou's land was in wheat in 1961?
(b) What proportion was in clover and other types of fodder?
(c) What proportion was in summer fallow?
(d) In your notebook, make a copy of the map of the farm shown in Figure 6—13. Indicate on your map the various uses of the land, according to the information given above.
2. (a) Why does Mr. Faurschou keep no stock?
(b) Describe work on the farm around the year. Why is winter a busier season on this farm than on many prairie farms?
(c) What is summer fallow and what is its purpose?

The Faurschou farm shows typical features of the prairies, but differs from many western farms in having no livestock. It forms part of the 7,000,000 acres of Manitoba that are sown in field crops. In the southern part of the province, wheat is still the principal cash crop, but it is no longer "king" as it was 50 years ago when "No. 1 Manitoba Hard" became the name by which Canadian wheat was known in the grain markets of the world. During recent years, barley and oats have become increasingly significant. Other important field crops are flax seed, corn, peas, alfalfa, hay, clover, sugar beets, and vegetables for canning. Figure 6-20 shows the acreages devoted to the various crops in the province.

Farm animals contribute almost half the agricultural income of the province. Beef cattle are fattened and, with the growth of Winnipeg and other cities, milk production has become very important. Pigs and poultry also have significance in several areas of southern Manitoba.

Manitoba agriculture is becoming more and more varied and as the population of the province expands, this trend towards mixed farming is likely to increase. How does mixed farming help to save farmers from economic disaster? Why is it better for the soil?

Agriculture in Southern Manitoba

1. (a) Refer again to Figure 6—7 and locate the towns of Winkler, Altona, and Emerson, where large crops of sunflowers are grown.*
(b) Study Figure 6—19. How can you tell that there is slightly more rain in this very southern part of Manitoba than in the central parts of the prairies? How can you tell that the weather is warm?
2. Figure 6—20 provides land use data for the whole surveyed area of Southern Manitoba.
(a) Compare this with the land use map that you drew of the Faurschou farm.
(b) What proportion of the total area is improved land?
(c) What is the state of the unimproved land?
(d) Less than ten percent of the surveyed area is woodland. Name a region of eastern Canada with a low proportion of woodland like this.
(e) What proportion of the improved land is in field crops?
(f) Name the five leading field crops by acreages.
(g) What proportion of the improved land is summer fallow?
(h) Make a list of five food processing industries, using local produce, that you would expect to find in southern Manitoba.

6—19 A field of sunflowers near Altona (Manitoba Department of Industry and Commerce photo)

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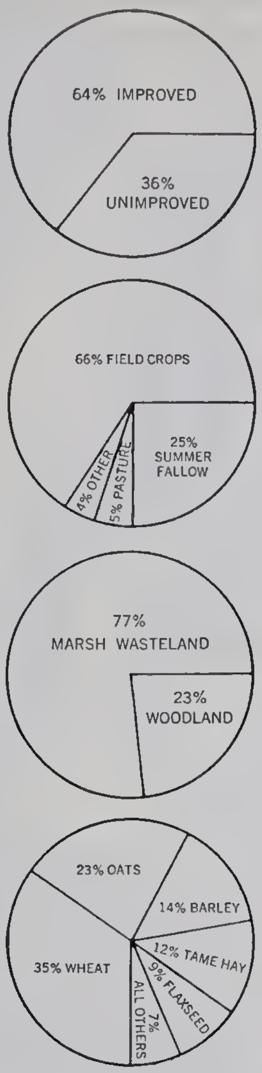
*From the seeds of these flowers can be extracted an oil used for all kinds of cooking purposes. The only sunflower seed processing plant in Canada is located at Altona.

	Acres
Total area of land	**17,950,000**
Total improved land	**11,550,000**
Total field crops	**7,604,850**
Wheat	2,659,000
Oats	1,831,000
Barley	1,071,000
Rye	85,000
Mixed Grains	145,000
Flaxseed	707,000
Corn	10,000
Peas	30,000
Buckwheat	25,000
Soybeans	500
Potatoes	17,000
Sunflowers	19,000
Rapeseed	33,000
Mustard seed	450
Grasses and legumes	50,000
Corn (fodder)	26,900
Sugar beets	25,000
Tame Hay	870,000
Summer Fallow	2,886,000
Pasture (modified)	609,150
Other (roads, farmsteads, etc.)	450,000
Total unimproved land	**6,400,000**
Woodland	1,500,000
Marsh, Wasteland	4,900,000



(a) Improved and unimproved land in the surveyed area of Manitoba (17,950,000 acres)

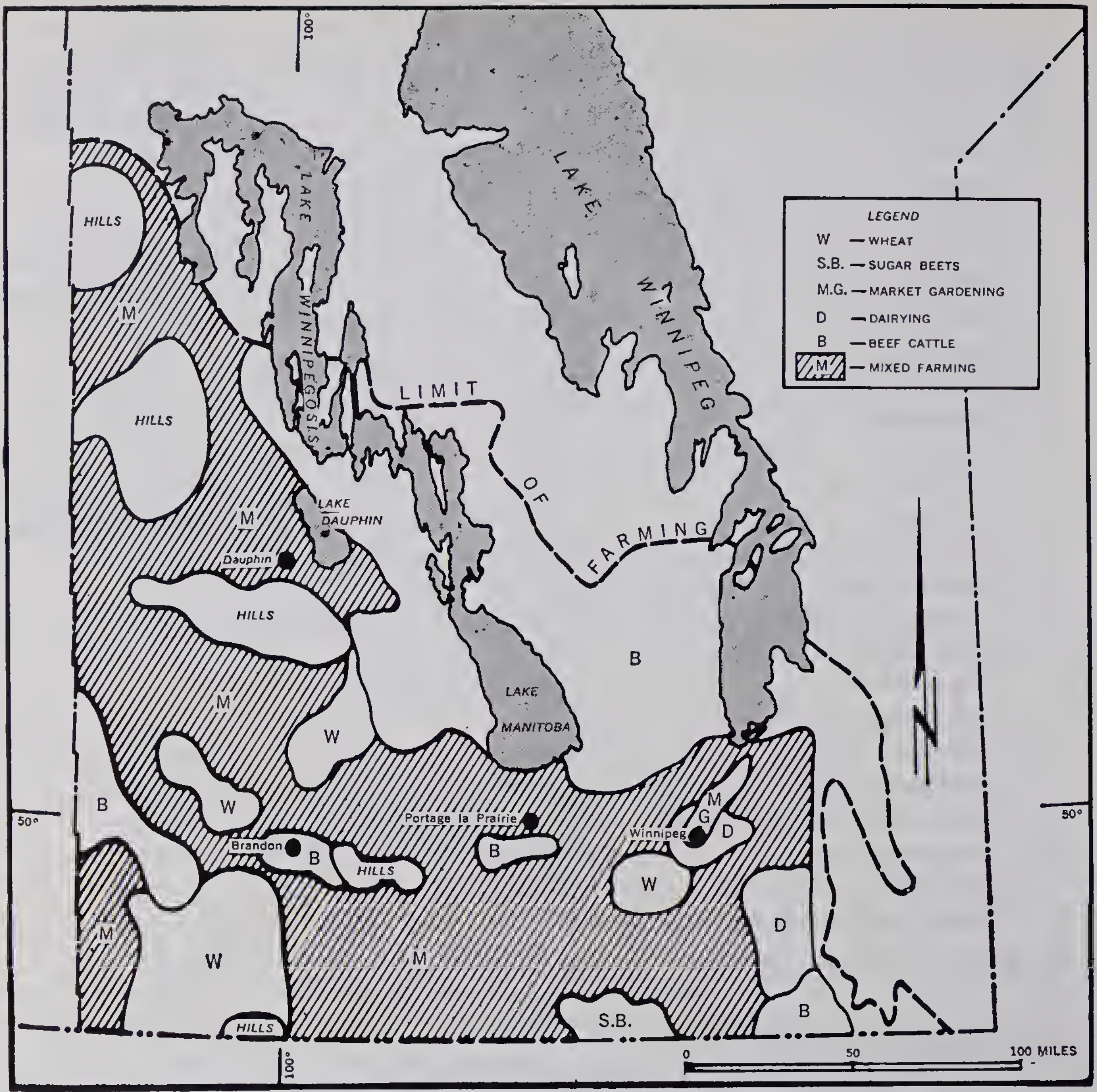
(b) Use of improved land (11,550,000 acres)

(c) State of unimproved land (6,400,000 acres)

(d) Use of land devoted to field crops (7,604,850 acres)

6—20 Disposition of lands in the surveyed area (Acres in 1960)

3. Study Figure 6—21.
(a) What type of farming occupies most of the land?
(b) What is noticeable about the location of the land devoted to dairying and market gardening?
(c) Where is most of the wheat acreage located?
(d) Where are the main areas of beef cattle raising? Where else would such cattle and other livestock be found in large numbers?
(e) Manitoba was once "one great wheat farm." How does this map indicate that farming has changed during the past 30 years?
(f) Study the chart of farming types shown underneath the map. Relate each type described to the map. Note the main forms of land use (crops, fallow, pasture, woodland) of each type.
4. Figure 6—22 indicates the varying climatic conditions faced by farmers in Southern Manitoba over a period of ten years.
(a) What was the range of time between the earliest and latest dates of break-up of the ice on the Assiniboine River at Winnipeg during this decade?
(b) In which year was frost probably the greatest problem to farmers?
(c) What was the range of time between the earliest and latest dates of wheat seeding, wheat harvesting, and the end of ploughing during this decade?
5. Study Figure 6—23.
(a) How can you tell that this photograph was taken fairly near the northern part of the prairies?



	No. of Farms	Avg. Size (acres)	Improved Land (acs.)	Crops (acs.)	Fallow (acs.)	Pasture (acs.)	Woodland (acs.)
Livestock Specialty (70% of sales from livestock and livestock products)							
1. Dairying	2347	244.8	107.4	77.9	14.9	9.6	53.6
2. Beef Raising	2268	385.3	103.5	61.0	11.9	17.7	105.1
Grain Specialty (70% of sales from grain and hay)							
3. Mixed Grains (no single crop exceeds 40% of acreage)	10,303	446.1	347.3	223.3	89.9	11.0	19.8
4. Wheat (wheat acreage exceeds 40% of total acreage)	3389	487.2	369.3	245.1	111.9	10.3	22.0
Cash Crop-Livestock Combination (less than 70% of gross revenue from either crops or livestock)							
5. Cash Crop Emphasis (crop revenue exceeds livestock)	20,507	374.4	258.0	157.5	73.6	14.7	30.8
6. Livestock Emphasis (livestock revenue exceeds crops)	7053	338.7	209.0	117.5	36.4	29.3	36.7
Special Crops							
7. Canning and Processing Crops (Pembina area and Portage Plains)	1580	167.1	161.8	128.4	21.5	6.2	0.5
8. Market Gardening (vegetable crops near Winnipeg)							

(from the Economic Atlas of Manitoba)

6—21 Main farming types in Southern Manitoba

Year	Assiniboine River clear of ice at Winnipeg	Date Wheat seeding became general	Wheat harvest begun generally	Ground frozen stop ploughing
1951	April 20	May 11	August 15	October 31
1952	April 18	April 19	August 8	November 24
1953	April 15	May 5	August 15	November 21
1954	April 18	May 18	August 16	November 25
1955	April 11	May 20	August 5	November 2
1956	April 26	May 14	August 15	November 10
1957	April 19	May 4	August 15	November 15
1958	April 10	April 22	August 20	November 17
1959	April 15	April 23	August 13	November 3
1960	April 16	April 21	August 19	November 7

6—22 Dates of seeding, harvesting, and freeze-up in Southern Manitoba

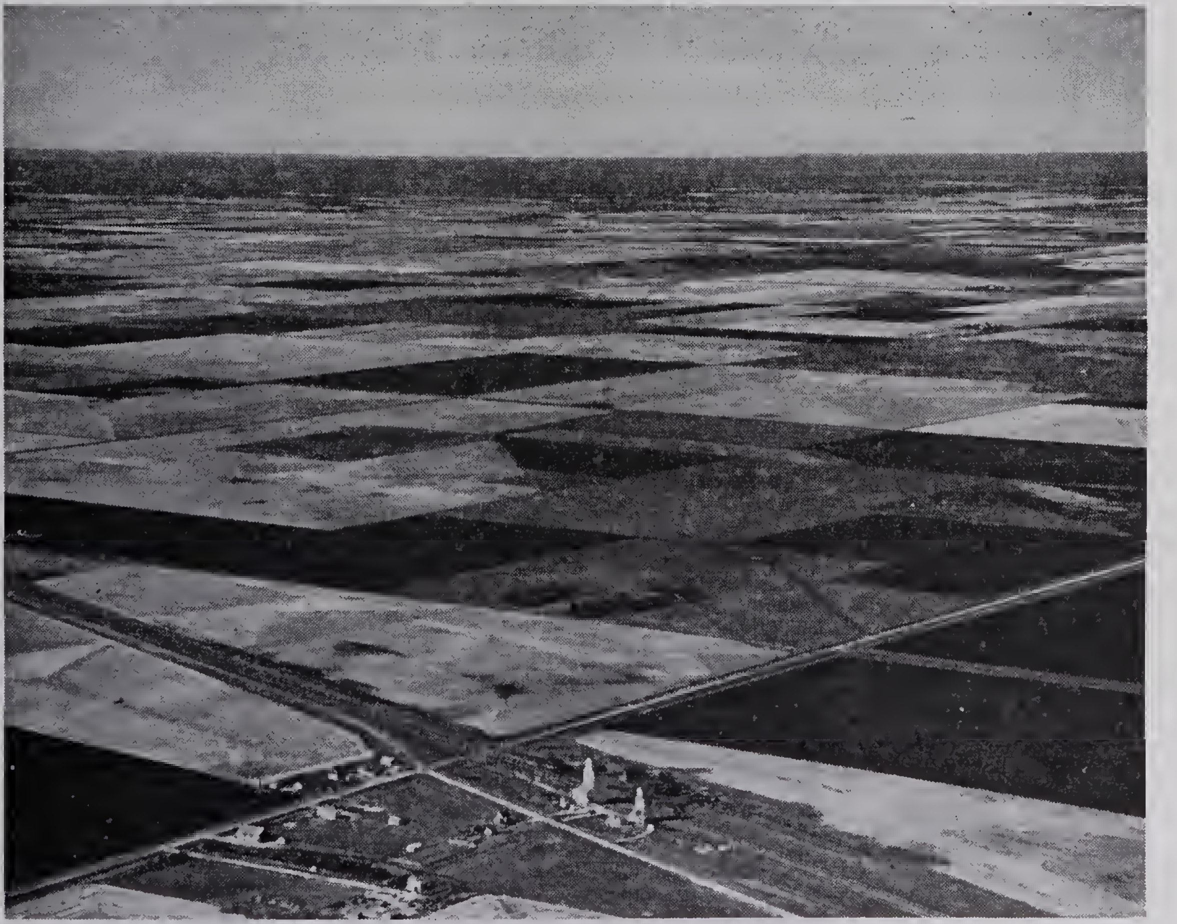
(b) In which season was the picture taken? Why are some of the fields black?

(c) Describe the relief of the area shown.

(d) Describe the land use. How does the photograph confirm what you learned about land use in Southern Manitoba in Figure 6—20?

(e) What are the two large buildings visible in this photograph? Account for their location there.

(f) On an outline map of Canada, trace the likely routes of wheat shipments from this place to Liverpool in England. On your map, label the main railway centres and ports through which such shipments would pass.

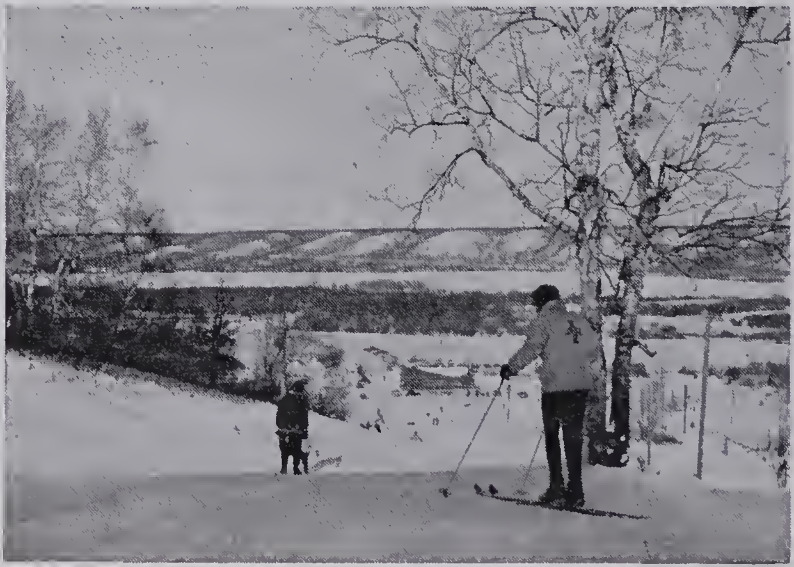


6—23 A typical crossroads and farming scene in Southern Manitoba (Manitoba Department of Industry and Commerce)

Relief features of the prairies

The flatness of the prairies is sometimes interrupted by a sudden escarpment. Elsewhere, wide river valleys form important relief features. This is clearly shown in Figure 6-24. This huge valley of the Pembina is now occupied by a small stream which by itself could not have formed such a feature. The valley was occupied by an enormous torrent of water, which flowed away from the edge of the melting ice sheet during the great Ice Age. The valley, cut deeply into the flat prairie by this meltwater, is called a *coulee*. Why do Winnipeggers travel more than 100 miles in winter to reach a place like this? How can you tell that the temperature is well below freezing there? What type of tree grows on these slopes?

As Figure 6-23 and our other studies have shown, most of Southern Manitoba is very flat. The original soils were mantled by material left as the great ice sheet retreated northwards. At its maximum extent, this ice sheet protruded southwards into the Dakotas, but during much of its existence it remained north of Winnipeg. This meant that Southern Manitoba was covered with moraine and glacial till which was later re-sorted by water. In fact, the ice that remained in Northern Manitoba prevented the meltwater from draining northward in its natural direction, towards Hudson Bay, which is the direction in which the Red River flows. Since the ice blocked the drainage northwards, a huge lake developed in Southern Manitoba. This was Lake Agassiz, which we have already noted in Figure 6-11. This great shallow inland sea drained southwards towards the Mississippi River. Streams and floods from all directions deposited debris into it. Great quantities of silt and mud were deposited on the floor of Lake Agassiz. When finally the ice sheet retreated northwards far beyond Manitoba

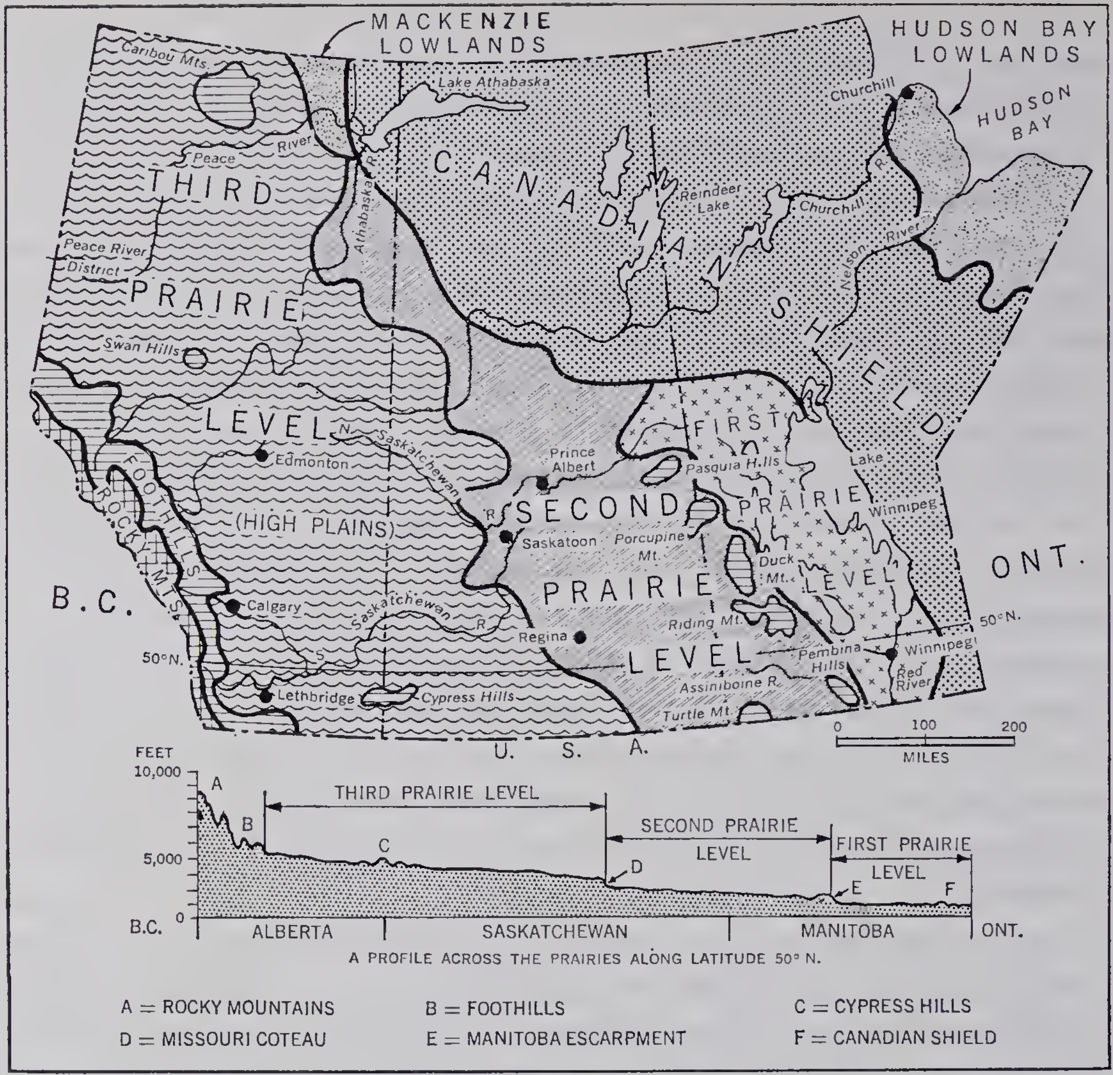


6—24 Winter sports in progress where the flat prairie relief has been interrupted near La Rivière to where it is today in Greenland, Lake Agassiz was drained, leaving an area of flat, fertile land in the Red River basin. Lakes Winnipeg, Winnipegosis, and Manitoba are the remains of the old inland sea. Huge areas of marsh still exist around them.

Thus, the end result of the Ice Age was to leave Southern Manitoba a flat fertile area interrupted only by the escarpment between lower and higher prairie and by occasional low hills. Black soils are not, however, just the result of mud deposited by glacial meltwater. They are also partly due to the lime content in the soil and more especially to the fact that Southern Manitoba was for countless ages covered by tall and short grasses. Much of the province, even in the prairie areas, was originally forested. But the extreme southwest and the southern Red River Valley were a great sea of grass which grew up fresh and green in late spring and summer and then died out in the fall, to be covered by a light snowfall during the winter. As it decayed, the vegetation slowly built up a high humus content in the soil, resulting in a black appearance. Today, as we travel northward into the forested areas, we notice that the soils appear grey rather than black. A review of Figures 6-8 and 6-9 will confirm some of the facts stated in this paragraph.

Our studies so far have made a number of references to escarpments and other relief features and differences in elevation in Southern Manitoba. Trace a line in Figure 6-7 joining Morden in the south to McCreary, Dauphin, Swan Lake, and Red Deer Lake in the north. West of this line, there is an escarpment that rises abruptly some 500 feet or more. As a result, the western prairie which is fairly flat, is 500 to 1000 feet higher than that around Winnipeg. Figure 6-25 shows that two of the three *prairie levels* are found in Manitoba. The black line between the first two levels marks the course of the escarpment mentioned above. Note four areas of upland or highland within the second level in Manitoba. Identify these on the map and in the physiographic diagram in Figure 6-7. Note how the escarpment shows up on the diagram. The upland areas are little used for agriculture, but Riding Mountain is an important national park of western Canada. Which prairie level occupies the greater part of southern Saskatchewan? What name is given to the third prairie level in Alberta? About how much of that province does this level occupy? Study the profile underneath the map in Figure 6-25. What is the general elevation of each prairie level?

We have noted that the escarpment is not continuously or equally high all the way from south to north. The Assiniboine River breaks it



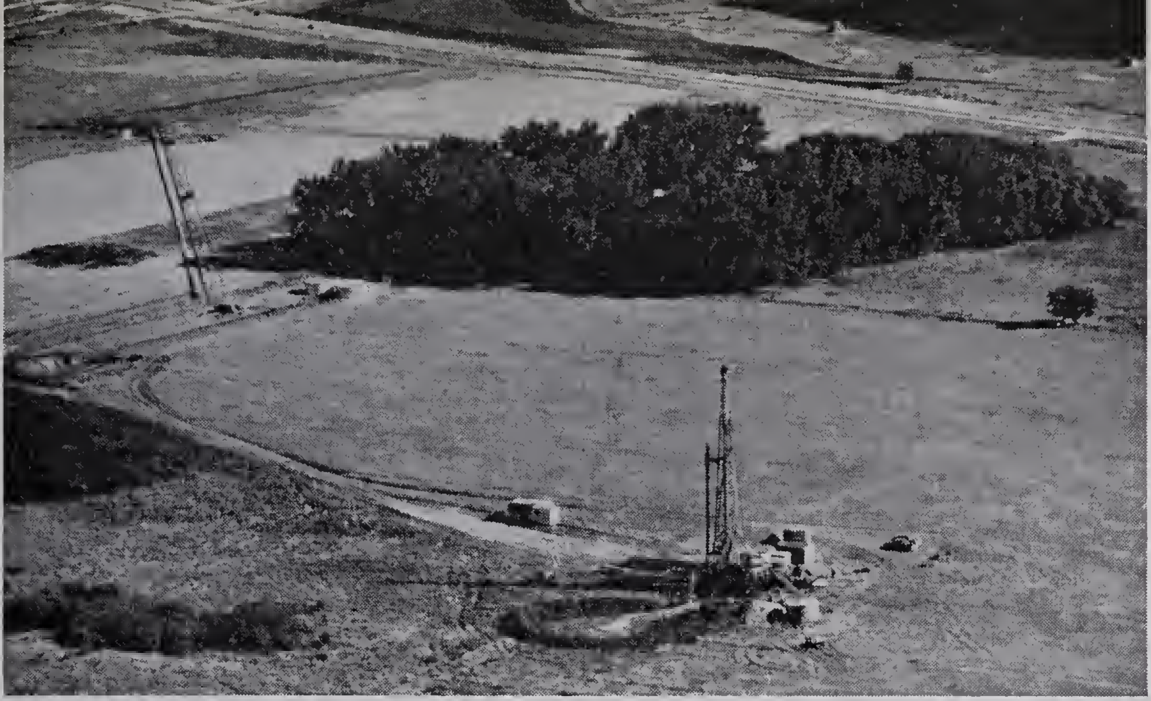
6—25 Relief and elevation vary considerably on the Prairies.

down between Portage la Prairie and Brandon. As a result, there is a westward extension of the lower prairie. Similarly, the Valley River near Dauphin causes a westward extension of the lower prairie, just as the Swan River does between Duck Mountain and Porcupine Mountain.

Other resources of the prairies

Locate Virden, in Western Manitoba, in Figure 6-7. Now study Figure 6-26, which was taken in this area. Oil produced there is piped away to townships far away. The small derrick at the surface and a few oil storage tanks do not prevent the land from being used for the production of wheat. In all the Prairie Provinces today, we find land being used in the two ways shown in this photograph.

How can you tell that the photograph, Figure 6-27, was taken near the northern margin of good cultivated land in Manitoba? This shows

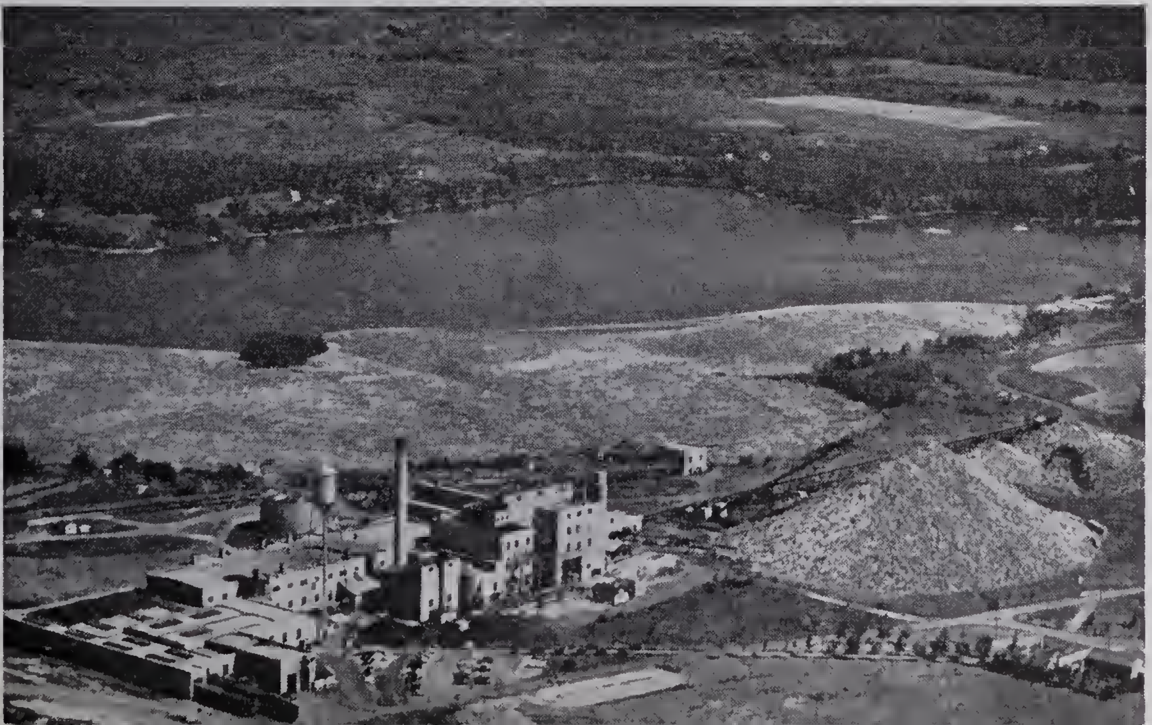


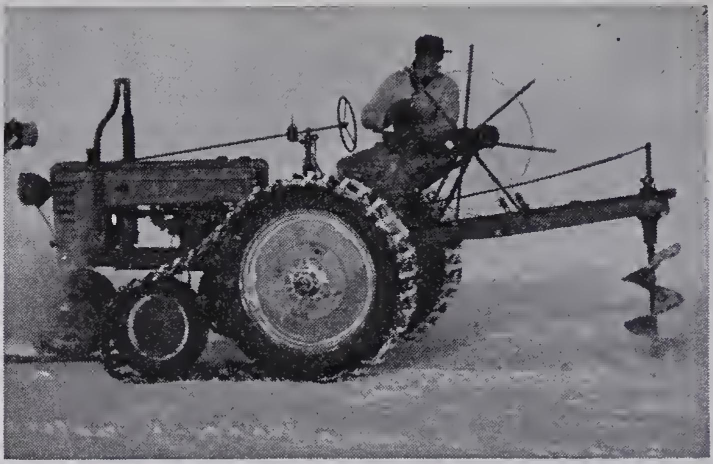
6—26 An oil well on farmland near Virden (Manitoba Department of Industry and Commerce photo)

a pulp and paper factory at Pine Falls on the Winnipeg River. Why is this a good location for this industry? Again note that two forms of land use may be seen.

Figure 6-28, a scene on Lake Winnipeg, shows that Manitoba's many lakes are a source of wealth, even during the cold winters. A large hole is being bored into the four or five feet of ice that covers the surface of the lake. When properly bored, the hole is protected from the wind and weather by a tent, so that it does not freeze over quickly again. Through the hole, the fishermen let down baited lines. Winter fishing is done both for sport and commerce. Many fishermen own small wooden cabins which can be moved about the ice on wheels. In them, they can light fires and be snug and warm while fishing in the middle of a lake when the temperature is well below zero outside.

6—27 Where lowland and Shield meet, near Pine Falls (George Hunter photo)





6—28 Unusual equipment is needed for fishing in Manitoba's lakes in winter.

Figure 6-29 shows a view of Gimli, a commercial fishing town on the shores of Lake Winnipeg. Locate Gimli in Figure 6-7. Fishing on this huge lake is rather like fishing at sea and so properly equipped boats go out on expeditions and bring their catch back for processing at ports like Gimli. This place was originally settled by Icelanders, who wished to continue their traditional occupation of fishing. Summer sport fishing attracts thousands of tourists to Manitoba. In the autumn, many hunters from the United States bring substantial income to the province.

The preceding paragraphs have made it clear that Southern Manitoba has non-agricultural sources of income. It also has important secondary industries. The statistics in Figure 6-30 are interesting in comparing agricultural production with other forms of production.

It is clear that Manitoba has a diverse economy. Despite the importance of agriculture, its major industry is manufacturing. Which manufactures are based on local raw materials? This will become clearer as we study the province's greatest city.

6—29 A maritime scene at Gimli on Lake Winnipeg in Southern Manitoba. Commercial fishing is an important industry there.

Agriculture		
Field crops	$175	million
Livestock production	65	"
Dairy products	33	"
Garden products	9	"
Poultry products	25	"
Fur farming	4	"
Manufacturing		
Foods and beverages	296	"
Iron and steel products	78	"
Petroleum products	62	"
Clothing	53	"
Transportation equipment	54	"
Paper products	42	"
Printing and publishing	40	"
Wood products	35	"
Non-ferrous metal products	19	"
Non-metallic mineral products	25	"
Chemical products	19	"
Electrical apparatus	18	"
Leather products	9	"
Fish products	6	"

6—30 Value of production of certain farm and industrial products in Manitoba, 1960

Winnipeg in photograph and map

1. Match Figures 6—31 and 6—32.*

(a) Name the two rivers shown in both the map and the photograph. By which route do their waters finally reach the open sea?

(b) In which direction was the camera pointing when the photograph was taken?

(c) How does the photograph confirm what you already learned about the relief of Southern Manitoba?

(d) The main Canadian National Railways yards are shown at the junction of the two rivers. Locate these yards in both the photograph and the map.

(e) Winnipeg is the capital of Manitoba. Locate the Parliament buildings in the foreground of the photograph. On the bank of which river do they stand?

(f) The tall buildings in the photograph are in the chief downtown business district of Winnipeg. Describe the location of this district in relation to the two rivers. Portage and Main streets, one of the most famous crossroads in Canada, are at the junction of fur trading routes of the old days. Today, they are the centre of the business and commercial district shown in the photograph.

2. Figure 6—33 shows the Canadian Pacific Railway yards in Winnipeg—the largest privately-owned yards in the world.

(a) Locate these yards in Figure 6—31, to the north of the central business district.

(b) Which river appears in the background of Figure 6—33?

(c) In which direction was the camera pointing?

(d) Locate these yards on the map in Figure 6—32.

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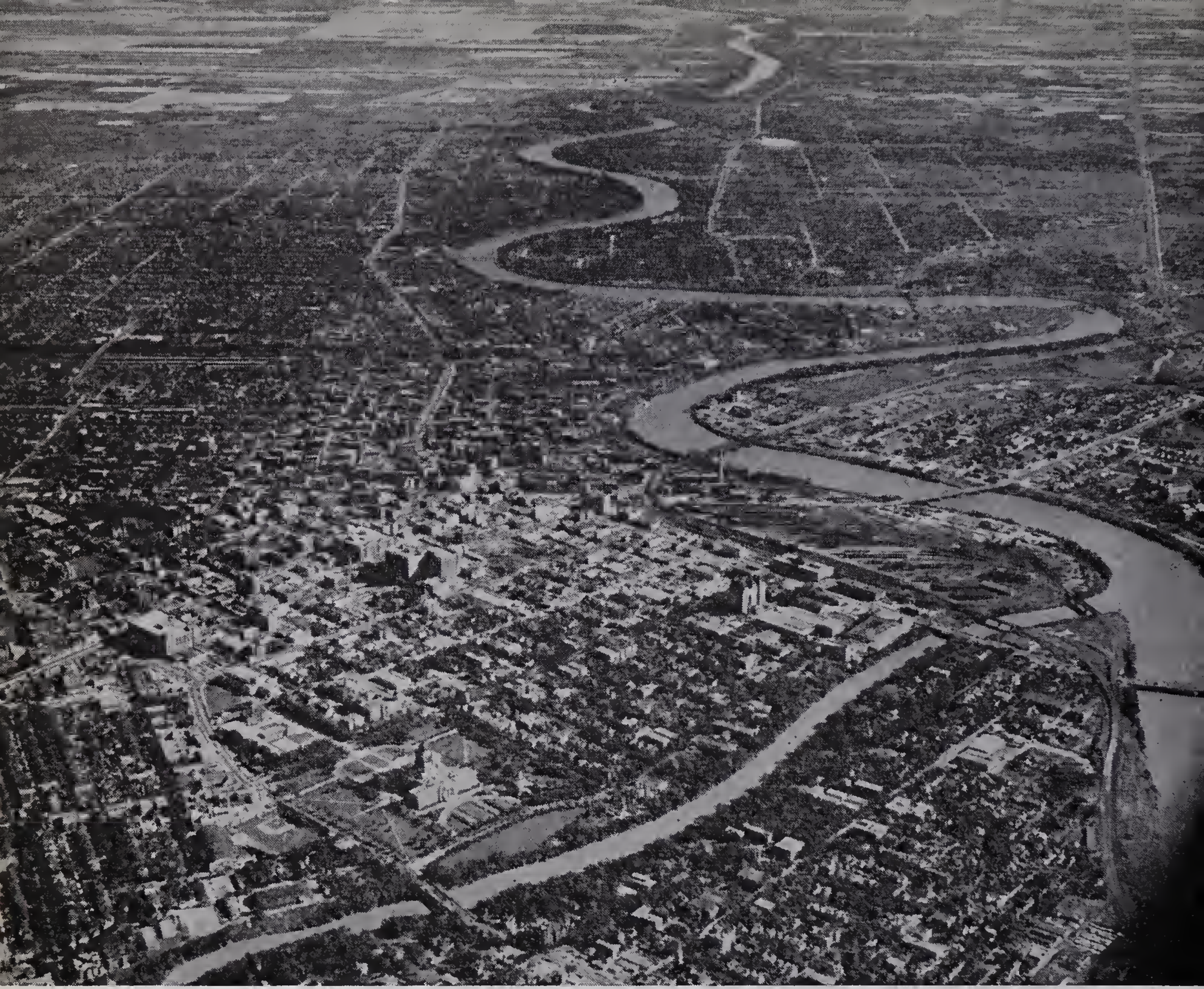
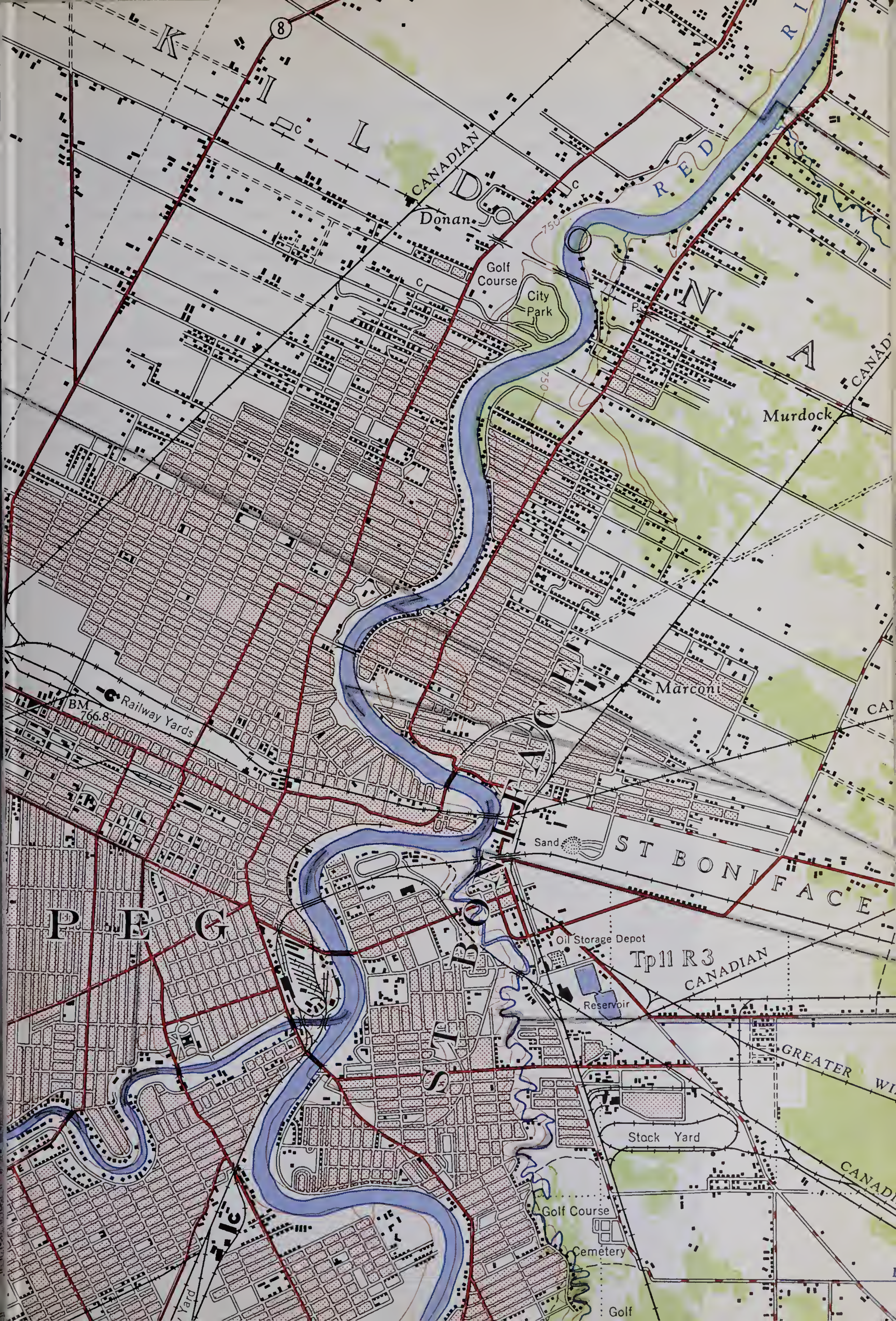
*The topographic map is an extract from Sheet 62H/14 (East Half, Scale 1:50,000) in the National Topographic Series.



6—31 Aerial view of Winnipeg, the largest prairie city (National Film Board photo)

6—32 (opposite) Large-scale map of Winnipeg in the National Topographic Series (Scale 1:50,000)

3. (a) Name several industries of Winnipeg that are shown on the map.
(b) What is the approximate elevation of Winnipeg above sea level, according to the map?
(c) How have the rivers influenced the street pattern of Winnipeg? What indication is there that the settlers laid out their farms in long, narrow strips, as along the St. Lawrence at Quebec?
(d) Locate St. Boniface. This is the chief suburb of Winnipeg and the centre of the largest slaughtering and meat-packing industry in western Canada. Describe the location of this French-speaking suburb in relation to central Winnipeg.
(e) Sum up the information on the map that is not available in the photograph.
(f) What information do the photographs give that cannot be found on the map?
4. Figure 6—34 is a map of Winnipeg and the surrounding Red River Valley on a smaller scale.
(a) What information does the map provide about the importance of Winnipeg as a junction of both rail and road routes?
(b) What indication is there that the Red River basin is a flat area?


8
K I L D O N A N
CANADIAN
Donan
c
Golf Course
City Park
750
RED RI
Murdock
CANADI
Marconi
BM 766.8
Railway Yards
Sand
ST BONIFACE
ST BONIFACE
PEG
Oil Storage Depot
Tp11 R3
CANADIAN
Reservoir
GREATER WI
Stock Yard
CANADI
Golf Course
Cemetery
Golf
Yard
Ic
CA

(c) How can we tell that Winnipeg is the largest city of the basin?

(d) What evidence is there that many of the early settlers in Winnipeg were French-speaking? What did we learn from Figure 6—31 that indicated this possibility? Where did most of these French-speaking settlers establish themselves in relation to present-day Winnipeg? (Clue: Study the place names.)

(e) What indication is there that, as one travels east from Winnipeg, the land becomes unsuitable for farming?

(f) Locate Transcona in Figure 6—34. This contains large railway yards and repair shops, belonging to the Canadian National Railways.

(g) Where is Selkirk located in relation to Winnipeg? The largest steel mill in western Canada is found there.

(h) What details that appeared in Figure 6—32 have been eliminated from this map? What additional information about the site of Winnipeg and its surrounding district do we gain from Figure 6—34?

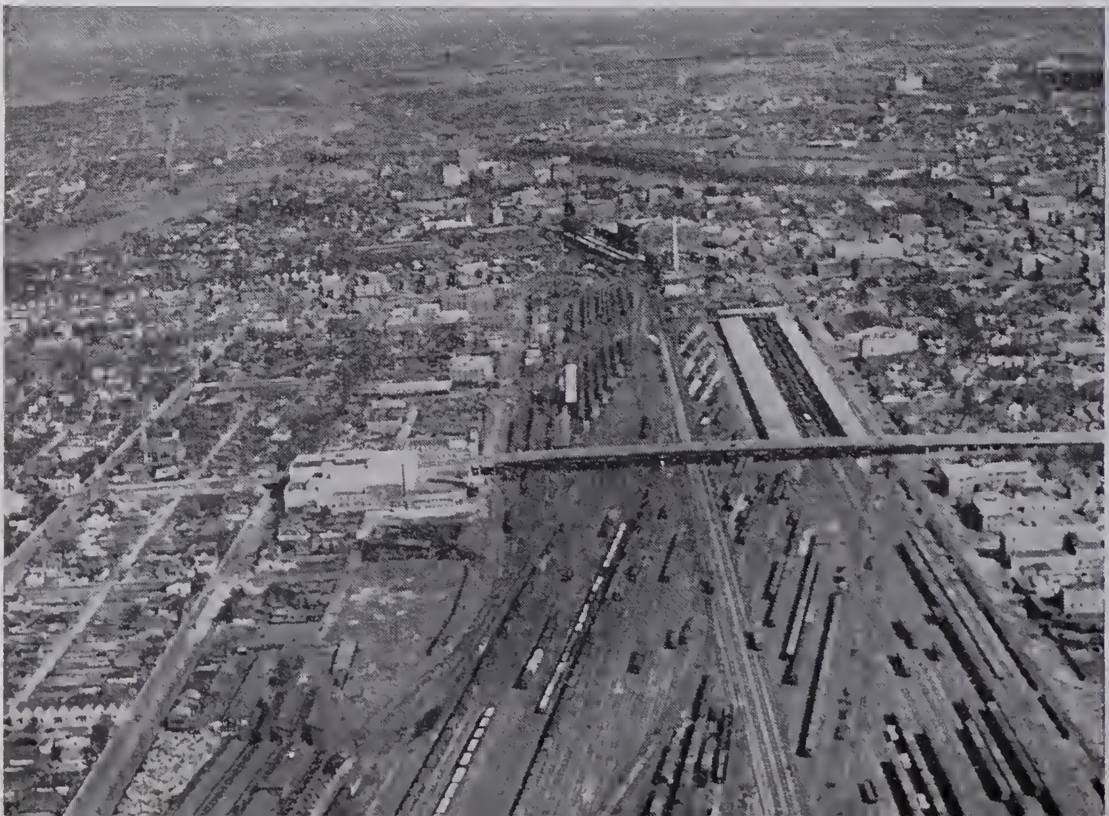
(i) Why is it beneficial to study maps on various scales when trying to learn about an area like Greater Winnipeg? What further information about the city could we gain from studying maps of Manitoba (as in Figures 6—7, 6—21, 6—25, etc.)? a map of Canada? a map of North America?

5. (a) Winnipeg has often been called "the gateway to the west." Study the position of the city in Figure 6—7. Which physical feature to the north and which political boundary to the south justify this term?

(b) Why has the gateway become the greatest focus of transportation routes in the Prairie Provinces?

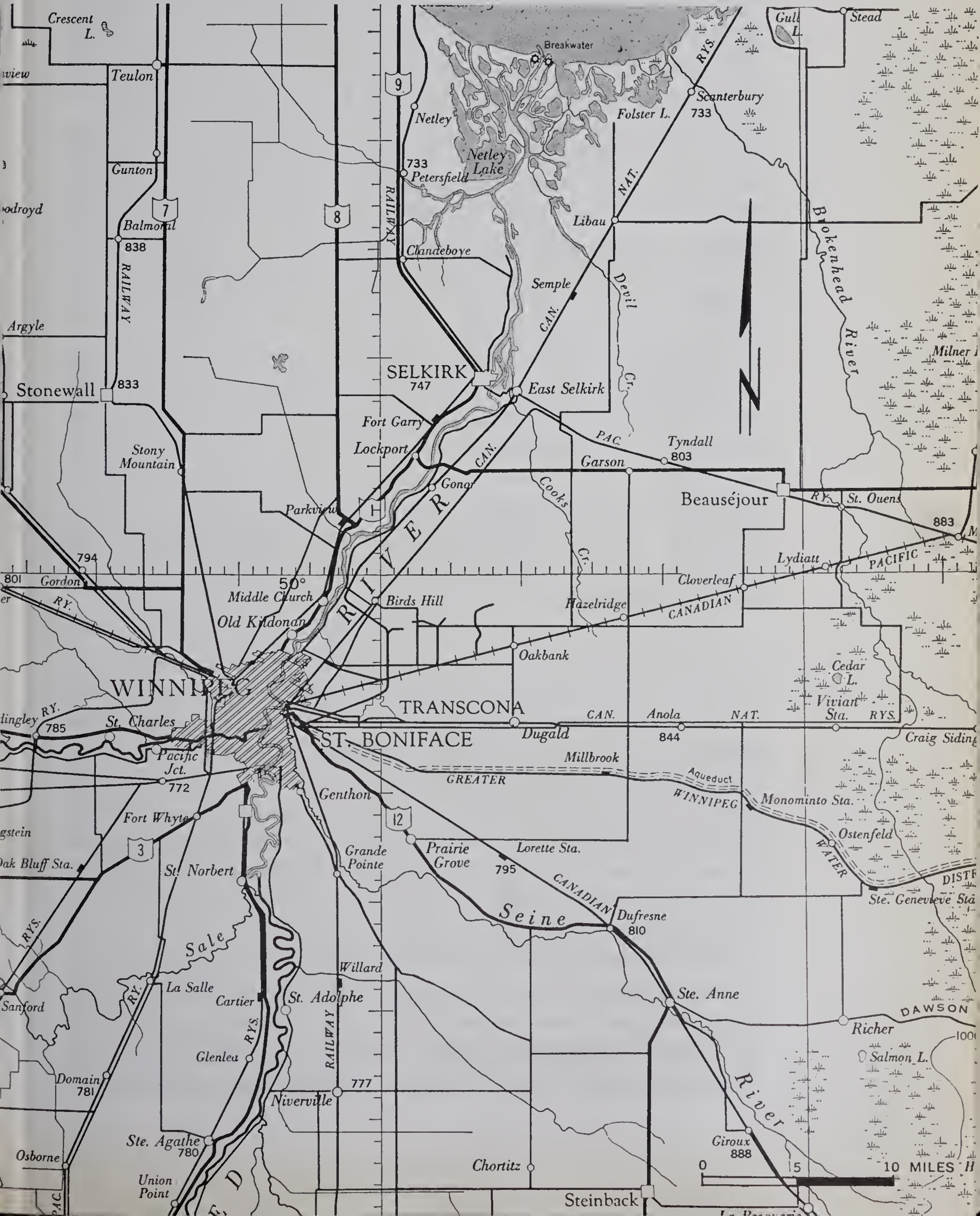
The name "Winnipeg" comes from a Cree Indian word meaning "murky waters." This suggests the large amount of material carried downstream by the Red River. As we have already noted, flooding can be a serious problem in this river basin. Winnipeg became an early capital of the fur trade, and Fort Garry, the old headquarters of the Hudson's Bay Company, is one of the chief historic sites in western Canada. The first important settlement here dates from 1811.

6—33 Winnipeg's Canadian Pacific Railway sorting yard (National Film Board photo)



However, it was the arrival of the railway 70 years later that contributed most to the growth of modern Winnipeg.

6—34 Winnipeg area on scale of 1″ to 8 miles (Department of Mines and Technical Surveys)



Our picture and map studies have indicated the importance of the railways today. The repair and service shops operated by the Canadian National Railways alone employ more than 4000 people. Altogether, more than 18,000 people earn a living directly from transportation. The Trans-Canada Highway passes through Greater Winnipeg and two major airlines serve the city, which has air connections with many United States and overseas points. Pipelines bring oil and natural gas. Winnipeg is only 450 miles from the Lakehead cities of Fort William and Port Arthur. The St. Lawrence Seaway, by reducing the cost of transporting grain, has influenced Winnipeg. Winnipeg is also served by the Great Northern Railway, which provides connections with the trans-United States lines. It is also connected with the Hudson's Bay Railway, thus providing access to Manitoba's seaport at Churchill. This and road connections with Northern Manitoba have extended the city's hinterland to include the new mining developments in the Canadian Shield.

To excellent transportation facilities must be added abundant hydro-electric power. Six developments on the Winnipeg River supply the city. Note the course of this river in Figure 6-7. Pine Falls is one of the most important of these developments which together form the largest hydro-electric power resource in the Prairie Provinces. To the west, thermal power units, burning brown coal or lignite, imported from Saskatchewan, provide electricity to Southern Manitoba. The rest of the province has immense quantities of hydro-electric power awaiting development.

A strategic location, transportation facilities, and abundant power are among the factors that have made Winnipeg the greatest manufacturing city of the Prairie Provinces. Winnipeg's hinterland includes not only the whole of Manitoba, but, in some respects, the other Prairie Provinces as well. Until the development of manufacturing at Regina, Calgary, and other centres, many of the manufactured goods of Saskatchewan and Alberta were made in Winnipeg. Even today, 40 percent of the value of all manufactured goods produced on the prairies are made in Southern Manitoba, mainly at Winnipeg. The prairies thus supply the chief markets for the city's goods, as well as many of the raw materials required.

Manufacturing at Winnipeg began more than 75 years ago, with the opening of plants for the processing of lumber and the milling of flour. Slaughtering and meat-packing have already been mentioned as the chief form of industry in the metropolitan region. Many other forms of food processing are also important. Winnipeg is the chief centre of clothing manufacture in western Canada, despite the fact that cotton, silk, and wool are not produced locally. Many of the local industries, such as the diesel engine repair shops at Transcona, the iron and steel works at Selkirk, and the huge meat-packing plant at St. Boniface, employ mainly men. This means that there is a considerable reserve of female labor willing and able to work at skilled trades, especially the manufacture of clothing. As a result, Winnipeg has become one of the fashion centres of North America.

Oil refining, printing and publishing, the manufacture of chemical, paper products, and many other forms of manufacturing are important. Altogether the city proper has more than 1000 firms employing more than 40,000 workers in at least 100 different types of industry. In Manitoba as a whole in 1960, more than 1700 firms were engaged in some form of manufacturing and produced nearly $800,000,000 worth of business. Variety is the keynote of industry. Decentralization is being encouraged. A plant for manufacturing soup has been established at Portage la Prairie; another factory has been set up at Carberry to process a large proportion of Manitoba's expanding potato production; a nuclear research project has been established at Whiteshell; another forest products plant has been built in southeastern Manitoba.

Greater Winnipeg contains more than 475,000 people, slightly more than half the population of Manitoba. It ranks as Canada's fourth largest metropolitan region. As the capital of the province and the seat of the University of Manitoba, Winnipeg has functions that would alone make it a noteworthy city.

NORTHERN MANITOBA: A DIFFICULT LAND OF VARIED RESOURCES

For our purposes, Northern Manitoba will be defined as the vast area, nearly three times the size of the Maritime Provinces, that lies north and east of a line joining Red Deer Lake and Shoal Lake. From Figure 6-7, it is evident that the character of the province changes as one goes north of this line. Most of Northern Manitoba is part of the Canadian Shield. As Figure 6-25 suggests, no other western province contains so much typical Shield scenery. Like Northern Ontario, this is a land of innumerable lakes, vast forests, and great water power and mineral wealth. Much of it is also a barren land where arctic climates and vegetation extend quite far south. In the neighborhood of Churchill, for example, polar bears may be seen during the summer and early fall. They swim ashore after the pack ice on Hudson Bay has broken up, and spend a few weeks along Manitoba's "seacoast."

Except around The Pas, which, although in Northern Manitoba, lies outside the area of Canadian Shield rocks, there is practically no agriculture in this region of the province. The pockets of farming scattered throughout the mining belts of Northern Ontario and Quebec are absent around the mining settlements of Northern Manitoba.

The unusual port of Churchill is a major asset of the region. All of Churchill's trade must take place in a very short three-month shipping season. It is usually impossible for ships to reach there before July 25th. Not only is Hudson Bay frozen up for many months of the year, but even during the short summer the shores are impeded by ice. Actually, Churchill is open well before July 25th, but vessels coming from the Atlantic Ocean can seldom get through earlier, because the ice floes close the sea passages between the Canadian mainland and the Arctic Islands much farther north.

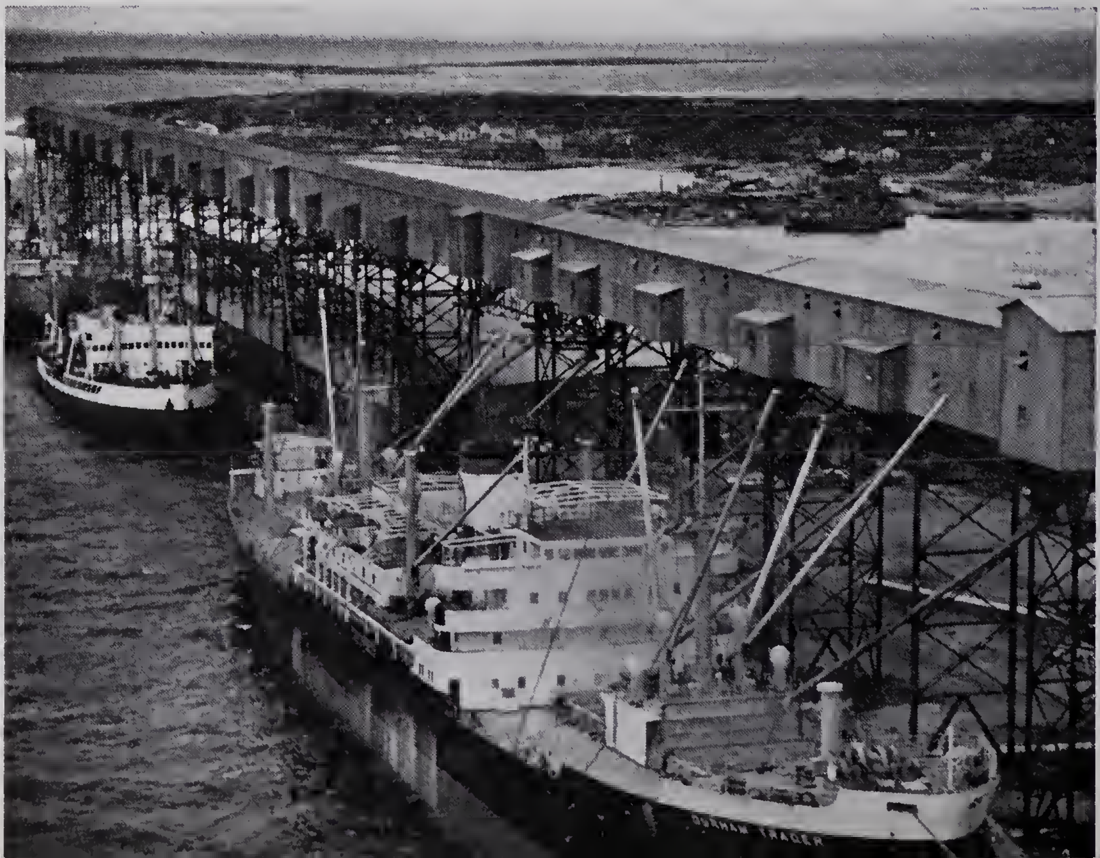
Until the close of the navigation season about October 15th, Churchill is a place of feverish activity. Since summer is a period of very long days at this latitude, the work of loading and unloading can go on for many hours at a time.

A study of Churchill and its hinterland

1. Figure 6—35 is an aerial view of Churchill, showing vessels waiting to load grain.

(a) How can you tell that this port is designed for very quick loading of wheat

6—35 Churchill on Hudson Bay is Manitoba's seaport and a link between Canada's prairies and the European Continent. (Manitoba Department of Industry and Commerce photo)



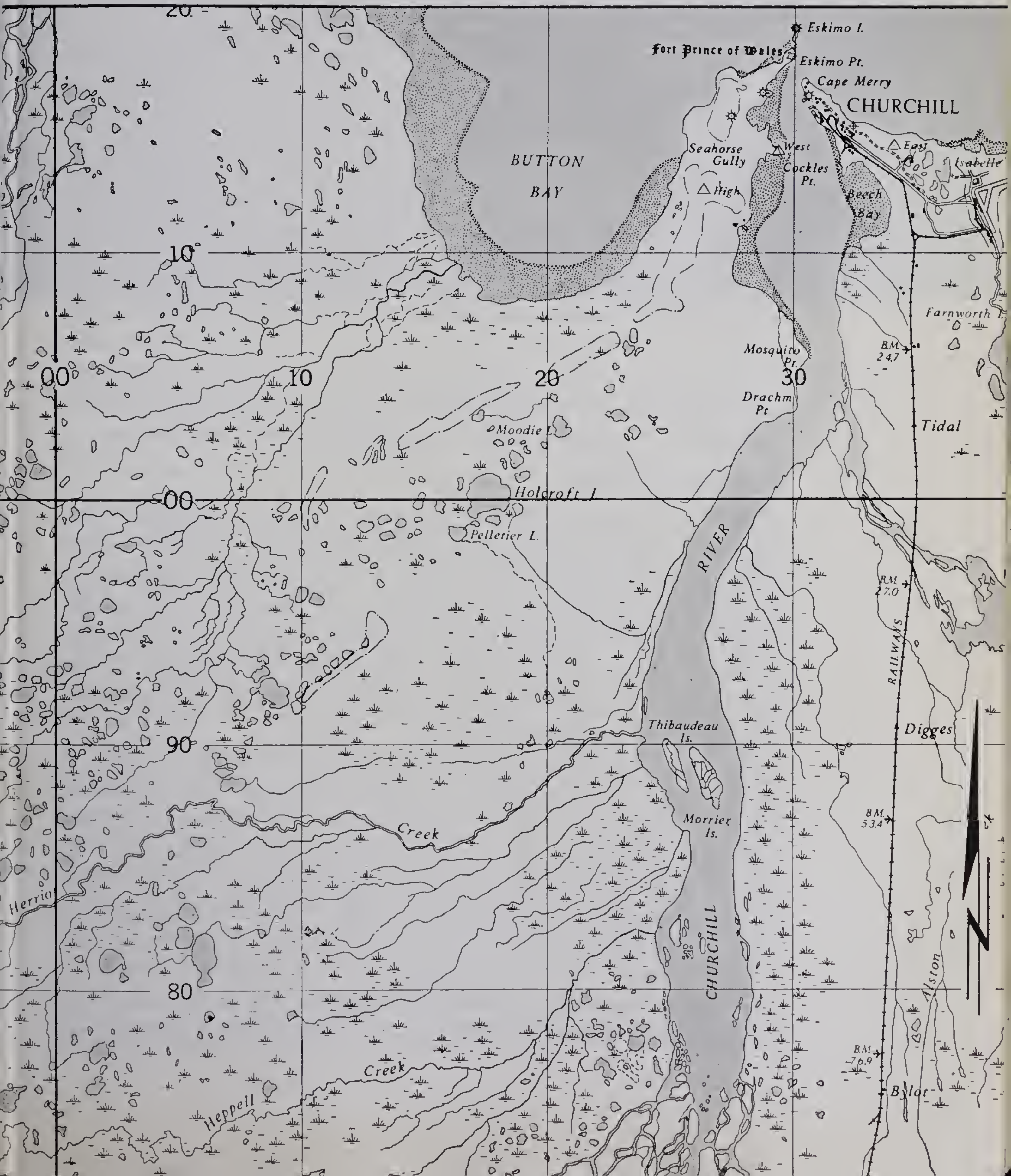
into ships? The grain elevator (capacity 2,500,000 bushels) is located to the right of the photographed scene.

(b) Why would the ships here be destined for Europe rather than Asia?

(c) By what means is wheat transported from the prairies to this port? Refer to an atlas map and trace the route of a shipment of grain from Regina to Liverpool, England, via Churchill.

(d) What advantage has Churchill over Montreal as a port for exporting prairie

6—36 Churchill area in scale 1:250,000 (Department of Mines and Technical Surveys)



wheat? How much longer is the shipping season on the St. Lawrence? Why has the St. Lawrence Seaway tended to reduce the importance of Churchill?

(e) What advantage has Vancouver over Churchill as a port for exporting wheat?

(f) Prince Rupert, on the coast of British Columbia, is, like Churchill, quite far north. It is able to export wheat throughout the year. Why is this so? Study the climatic graphs of Churchill and Prince Rupert in Figures 6—6 and 9—21. How do you account for the climatic differences between these places?

(g) What evidence is there in the photograph in Figure 6—35 that Churchill is in the Arctic? Describe the seacoast of Manitoba as it appears in this photograph.

2. Figure 6—36 is a map of Churchill and of the area southwest of this port.

(a) Name the three forms of transportation that serve Churchill.

(b) Comment on the size and population of the settlement as indicated by both map and photograph.

(c) Locate Fort Prince of Wales, the old Hudson's Bay Company post in this area. Where does it lie in relation to Churchill?

(d) What is the elevation of the land along the railway line?

(e) Describe the nature of the Hudson Bay Lowland as revealed by the map and photograph.

3. (a) Why is little of Churchill's food supply available locally?

(b) The port's electricity needs are provided by steam-powered and diesel-powered plants. Why is no hydro-electricity available here?

Churchill has been a grain port since 1931, when the Hudson Bay Railway was completed. In 1960, it exported about 20,000,000 bushels of grain. Three ships can be loaded at one time in a harbor that has a minimum depth at low tide of 26 feet. The growing mining industries of Northern Manitoba are providing additional business to the port.

Minerals in the North

Figure 6-37 shows the site of one of the mineral developments just referred to. There, at Thompson, is the second largest nickel smelter in the world. Study the surrounding area very carefully. Comment on the relief and vegetation. How can you tell that this is not in far northern Manitoba and yet not in the prairie region of the province? Locate Thompson in Figure 6-7. What is the physiography of the surrounding area according to the diagram? What are the difficulties of establishing a settlement there?

Thompson has been a spectacular development of recent years. A major problem in developing the mineral resources of the Canadian Shield has always been that of transportation. The construction of the Hudson Bay Railway to Churchill made it possible to explore the land through which the railway passed. Various mineral reserves in Northern Manitoba were discovered as a result. Construction of the new town of Thompson began in 1957 with the decision to exploit the extensive mineral ores in the district. By 1961, Thompson had become one of the greatest nickel-producing centres in the world. Its development has rivalled earlier projects such as the Labrador iron

6—37 The nickel smelter at Thompson (Manitoba Department of Industry and Commerce photo)

industry and the new aluminum industry at Kitimat.

The construction of Thompson involved felling trees, clearing land, building roads, and laying pipelines.* Every particle of equipment, from hammer and nails to bulldozers and from bread to blankets, had to be transported to the site over rough ground. The "snowball express" operated 24 hours a day, seven days a week, the tractor or "cat" trains moving 30,000 tons of material during the winter of 1957. The 70-mile round trip from the railway, over snow-covered muskeg and frozen lakes and swamps took 14 hours. It was a desperate race against time to bring in the power shovels, cranes, fuel oil tanks, building materials, and hardware of every description before the oncoming spring weather would render transport impossible. Work also proceeded on the 31-mile branch railway line that links the Thompson works with the Hudson Bay line of the Canadian National Railways at Sipiwesk. This meant the arrival of more workers, more equipment, and more materials. Hoists were installed, shafts were sunk, heavy mechanized equipment was moved into place, and temporary housing and feeding facilities for 3000 people had to be erected on ground offering peculiar difficulties. It was covered with super-saturated clay which had to be cleared away, for it was frozen rock-hard in winter and became a quagmire as soon as the spring thaw had set in.

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*This discussion is based partly on "The Thompson Project" by Sylvia Seeley, in *The Canadian Geographical Journal,* Vol. LXIII, No. 5, November 1961, pp. 158-169.

In the course of road construction this far north, permafrost was a major obstacle to be overcome.* In this district, the road builders found it easier to work while the snow was on the ground as it gave their machines better traction. A heavy shovel, together with a ripper when necessary, had little difficulty cutting through the permafrost to excavate for water and sewer mains.

At present, there are 24 miles of provincial highways south of Thompson, six miles of road to the north, connecting Thompson with its airport, and ten miles of road laid to the lakes, to the railways, and to the rivers. Within the town of Thompson itself there are 15 miles of roadways. There is passenger service six days a week by rail from Winnipeg. Three of these trains proceed to Churchill while three return directly to Winnipeg. There are six air flights a week between Winnipeg and Thompson.

Plans for all community facilities were set up before the first house was built in 1958. Power for the new town and the mine was made at the new Kelsey plant, developed by the Manitoba Hydro-electric Board at Grand Rapids, on the Nelson River, 53 miles northeast of Thompson. Figure 6-38, shows a view of this power development. An interesting fact about this station is that it is operated entirely by remote control from Thompson.

In order to keep the cost of production as low as possible, all mining processes are mechanized by the newest methods. After crushing, the ore is stored in an underground bin and later hoisted to surface storage bins. The other valuable minerals in the nickel ore are separated from the rock by a flotation process. The nickel concentrate is pumped to the Thompson smelter where it goes through various processes resulting in the production of pure nickel. This nickel is shipped to markets in Canada, the United States, and the United Kingdom to be used for making stainless steel, for the electroplating industry, and in making three thousand alloys that are strong, tough, and resistant to heat and corrosion.

Situated just two miles from the plant, and covering an area of 3000 acres is the new town of Thompson where 2200 men and women have permanent homes. Schools were opened in 1959 and the first high school was ready to operate in 1962.

An older nickel-mining development in Manitoba is that at Lynn Lake. Locate this town in northwestern Manitoba in Figure 6-7. It is another of the large nickel-producing centres in the world. Like Thompson, it is located in the forest belt of the Canadian Shield.

*For a full discussion of permafrost and the problems of building on it, see pages 459-461 of Chapter 10.

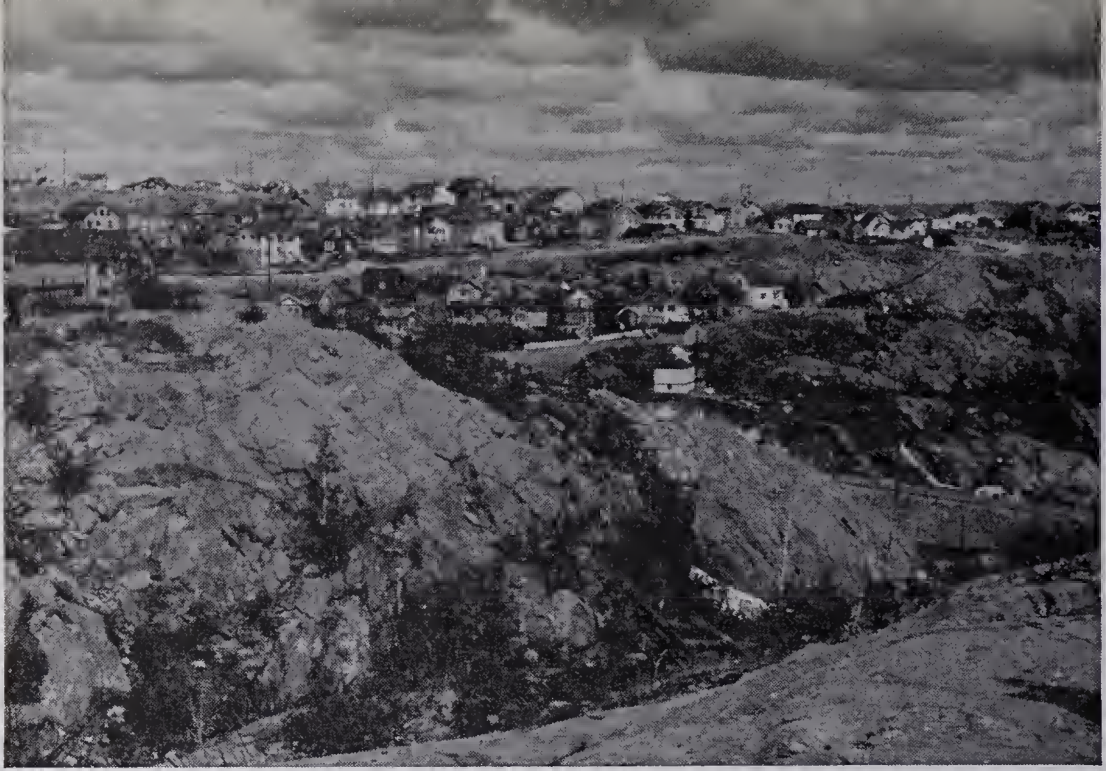
6—38 The Kelsey Power Development in Northern Manitoba (Manitoba Department of Industry and Commerce photo)

This town was first established in 1954 by moving many of the houses and other buildings from Sherridon, which lies about 125 miles to the south. The ores mined for many years at Sherridon had become exhausted and today, the place is a "ghost town" with less than 100 people. The buildings were moved to Lynn Lake by tractor train. The story of "the cats that moved a town" is one of the most amazing in Canadian mining history. Copper and cobalt as well as nickel are produced at Lynn Lake. A concentrating plant reduces the volume of the ore before it is sent southward by rail. Note Lynn Lake's rail connections in Figure 8-34.

Figures 6-39 and 6-40 show one of the older towns in Northern Manitoba. Locate Flin Flon in Figure 6-7. Note that it is near the Saskatchewan border. In fact, most of the ore-bodies are on the Saskatchewan side. However, Flin Flon accounts for most of Manitoba's copper, zinc, and silver output. Some gold is also mined there. Additional deposits of copper and zinc are under development about 80 miles east of Flin Flon.

Figure 6-40 shows some of the various levels on which Flin Flon is built. Most of the sidewalks are raised above the road level. They look like continuous wooden blocks; in them are carried separate pipes for the town water supply, sewage disposal, and steam. Why are the pipes not located underground? Why are they insulated before being covered by the boarded sidewalk? Why is a steam pipe located close to the sewage and water pipes?

Which features in Figures 6-39 and 6-40 tell you that Flin Flon is



6—39 A residential area in Flin Flon (Manitoba Department of Industry and Commerce photo)

a town in the Canadian Shield? State some important problems facing people in trying to establish a town on a site such as this. Note a mine headframe and the great smelter in Figure 6-40.

The Shield section of Manitoba extends into the southeast corner of the province. There, north of the Winnipeg River, various rare metals, as well as important ores of nickel, copper, and gold are mined. Power and pulp and paper developments on the Winnipeg River have already been noted as an important aspect of the Canadian Shield section of Southern Manitoba. The rest of the Canadian Shield in Northern Manitoba undoubtedly contains vast mineral wealth. Most of the region will likely remain very thinly populated, but minerals, forests, and water power will no doubt make it a great asset to the province in the future.

Summary and conclusions

1. The title of this chapter suggested that the resources of Manitoba are the legacy of an ice age. This is only partly true, but it is nevertheless a good way of thinking about the province.
(a) Why is the major effect of the Ice Age on Southern Manitoba seen in its soils? Trace the steps by which the ice sheets produced the fertile soil of this region.
(b) What effect did the ice sheets have on northern Manitoba? Why was this effect so different from that in the south?
2. A second major characteristic of Manitoba is the strong contrast between north and south. What are the chief distinctions between these regions in: (a) population distribution; (b) occupations of the people; (c) rock structure and scenery; (d) climate; (e) major products?
3. Great extremes are a third characteristic of Manitoba.
(a) Why is it so extreme?
(b) Why do people adjust their lives more obviously to winter than to summer conditions?

6—40 A general view of Flin Flon (George Hunter photo)

Manitoba's chief contributions to the welfare of Canada as a whole are of three main types. In the rich agricultural south, wheat, barley, and beef are all in considerable surplus. The hard rocks of northern Manitoba conceal vast quantities of nickel and copper and considerable amounts of lead, zinc, silver, and gold. The water-power resources of the great lakeland more than make up for any lack of coal power. Oil, timber, and fish add further to the province's exportable surpluses.

The flat prairies make transportation and export easy, and the great Canadian Pacific and Canadian National railyards at the huge route-centre of Winnipeg are some of the largest in the world. Even the severe winter has its advantages because movement by snow vehicle is easier in the north at this season than it is during the thaw. In fact, the effect of the extreme winter is not as great as statistics would suggest. Although outdoor farming operations must cease, all other types of activity (even fishing) continue. The snowfall is not very heavy, the skies are often clear and so winters are bright and cheerful. With all the modern devices for keeping warm, winter has lost most of its terrors. Its effect is more evident primarily in the cost of living. The growth of a great city at the junction of the Red and Assiniboine rivers, just where the great Canadian prairies begin to spread out in a wide fan to the west, was natural. As a supplier of prairie needs and as a collector of exportable surpluses, Winnipeg functions as the focal city of central Canada and a convenient stopping and refuelling place for aircraft travelling across the country. The construction of the St. Lawrence Seaway has enhanced its importance, while cheap electricity will continue to attract industries.

CHAPTER 7

Saskatchewan: Land of the Big Sky

Like Manitoba, much of Saskatchewan is also "the legacy of an ice age," as Figure 6-11 showed us. Most of Southern Saskatchewan also belongs to the second prairie level, which was explained in Figure 6-25. This part of the second level is often called the Saskatchewan Plains. As a result of variations that occur throughout these plains, it is possible to divide the southern part of the province into several regions. Parts of these extend westward into the third prairie level. Northern Saskatchewan is very different from the rest of the province and must be treated as a separate region. It is much like Northern Manitoba.

The regions of Saskatchewan to be studied in this chapter are shown in Figure 7-1. As we study each region in turn, we shall try to answer such questions as these:

1. What uses do people make of the land in each region?
2. What natural conditions (relief, climate, etc.) seem to influence the use people make of the land, and the way they live?
3. What problems do the people of the region face?

What can statistics teach us about the geography of Saskatchewan?

1. From the data given in Figure 7—2, make inferences about:

(a) the amount of occupied farmland in Saskatchewan compared with that in Canada as a whole.

(b) the size of farms in Saskatchewan. (Compare also with the size of the average farm in your neighborhood.)

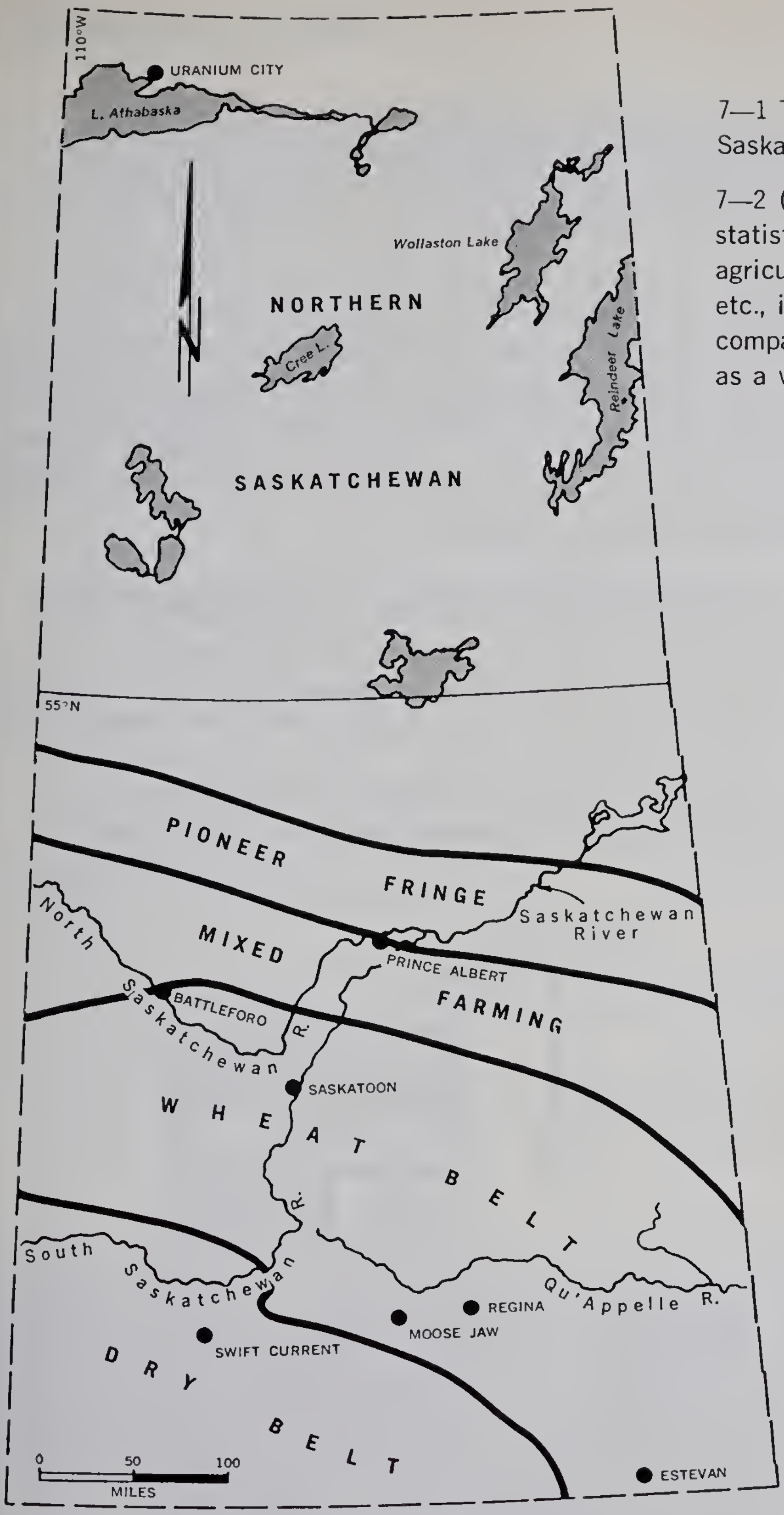
(c) the importance of wheat production in Saskatchewan.

(d) the distribution of people in rural areas and in towns and cities in Saskatchewan.

(e) mechanization of agriculture in Saskatchewan.

2. Compare the population of Saskatchewan with that of Metropolitan Toronto or Greater Montreal. (See Tables 1 and 2b on pages 486 and 487.)

3. Saskatchewan had fewer farms in 1961 than Ontario had and ranked second to that province in total farm income. It also had much more occupied farmland than Ontario. What do these facts suggest about:



7—1 The regions of Saskatchewan

7—2 (below) Certain statistics relating to agriculture, population, etc., in Saskatchewan compared with Canada as a whole

	Canada	Saskatchewan	% of the Canadian Total in Saskatchewan
Population (1961)	18,238,247	925,181	5.07
Area (sq. miles)	3,851,809	251,700	6.5
Amount of occupied farmland (acres)	172,551,051	64,415,518	37.3
Number of farms	480,903	93,924	19.5
Average size of farms	359	686	—
Wheat production (acres)	25,315,964	16,082,054	63.5
% of people living in rural areas	30.4	57.0	9.5
% of people in towns and cities (urban areas)	69.6	43.0	3.1
Number of farm tractors	549,789	126,613	23.0

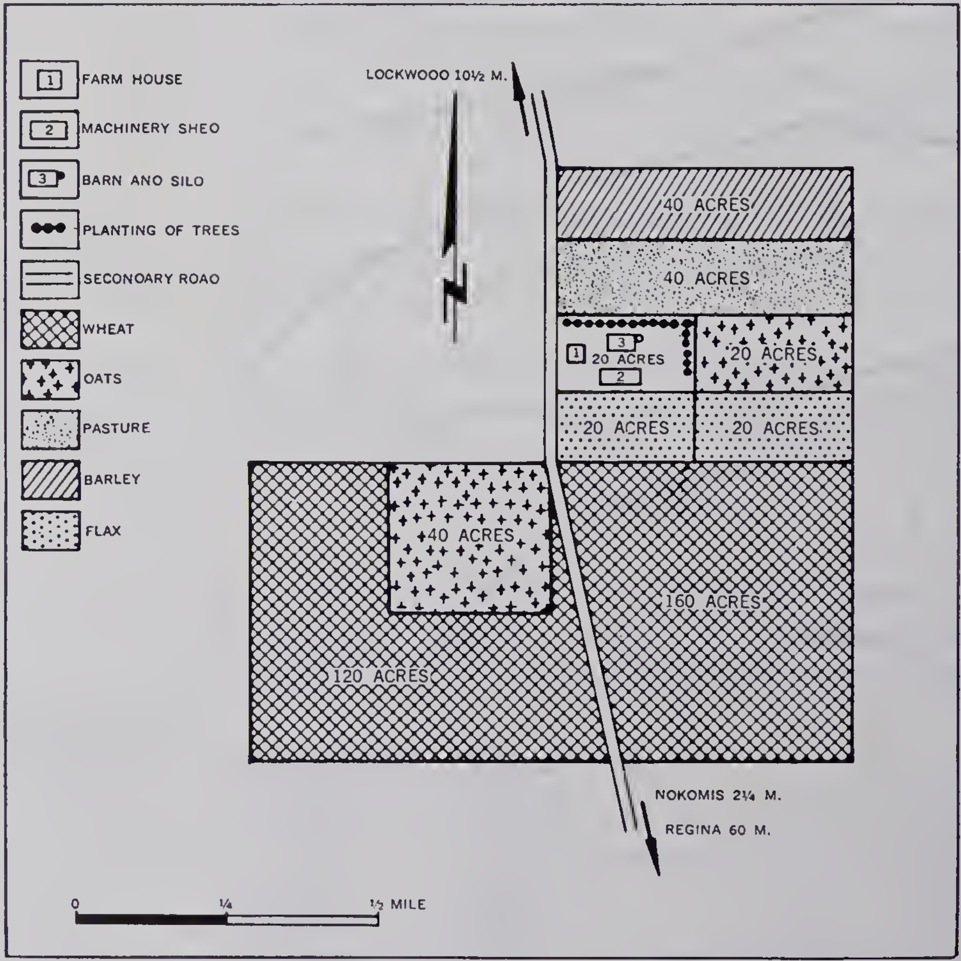
(a) the size of farms in Saskatchewan compared with those in Ontario?
(b) the intensity with which the farmland is used in the two provinces?
4. From a study of the data given in Figure 7—2, list some geographical characteristics which Saskatchewan possesses.

THE WHEAT BELT

Although some wheat is grown in nearly all parts of the Prairies, the bulk of it is grown in the band called the Wheat Belt that is shown in Figure 7-1. A typical area is called the Regina Plains. This is a name often given to the central and eastern section of the Wheat Belt, found within a 75-mile radius of Regina.

A study of a farm and a typical rural settlement on the Regina Plains

1. Figure 7—3 shows a map of Ben Day's farm, north of Regina.*
(a) What is the total area of the farm? What fraction of a section is this? Is this larger or smaller than the average Saskatchewan farm, according to Figure 7—2?
(b) What is the main crop grown? How much land is used for this crop?
(c) What other crops are grown, and how much acreage is used by each?



7—3 Map of Ben Day's farm (after F. C. Hardwick and A. Welsh)

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*The map and accompanying study of the Day farm have been made available through the courtesy of Prof. F. C. Hardwick and Mr. A. J. Welsh. The full study appears in *Understanding Maps*, published by Clarke, Irwin and Company Ltd. (Toronto, 1961).

(d) Compare the cropping pattern on Mr. Day's farm with that on the Faurschou farm studied in Chapter 6. Most of Mr. Day's wheat crop is sold for human or animal consumption. How does the Faurschou farm compare with the Day farm in this respect?

(e) How can you tell that Mr. Day owns livestock?

(f) How can you tell that he uses a considerable amount of machinery?

2. The local dark brown clay or "gumbo" was laid down in glacial times and like that on the Faurschou farm is some of the most fertile land in Canada. The growing season here is about 96 days long. Precipitation figures for Regina are as follows:

Prec.	J	F	M	A	M	J	Jl	A	S	O	N	D	Total
(")	0.65	0.59	0.78	0.81	1.60	3.24	2.13	1.74	1.22	0.85	0.86	0.62	15.09

(a) Compare the growing season here with that of the Portage Plains of the Manitoba Lowland, as studied on the Faurschou farm.

(b) Compare the total precipitation. What proportion falls during the period May-August inclusive?

(c) What inferences can you draw about the effects of climatic conditions?

3. Review the yearly operations on the Faurschou farm as given on page 269. Mr. Day's yearly routine is very similar, except that he has livestock. Cows and pigs must be housed throughout the long winter.

4. Figure 7—4 is an aerial view of the village of Pense, located on the C.P.R. line west of Regina.

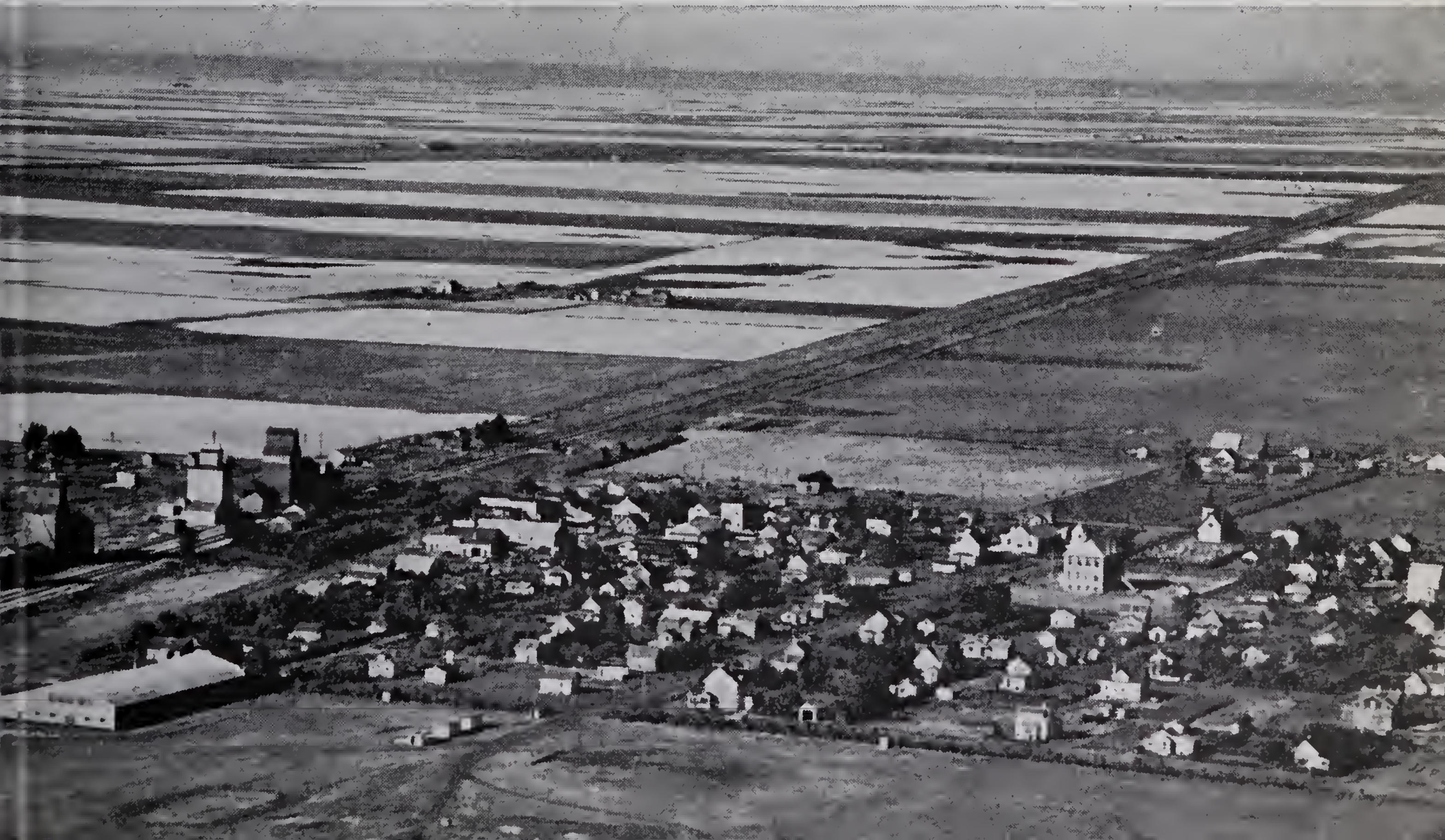
(a) Locate Pense on the map in Figure 7—6. How many miles west of Regina is it?

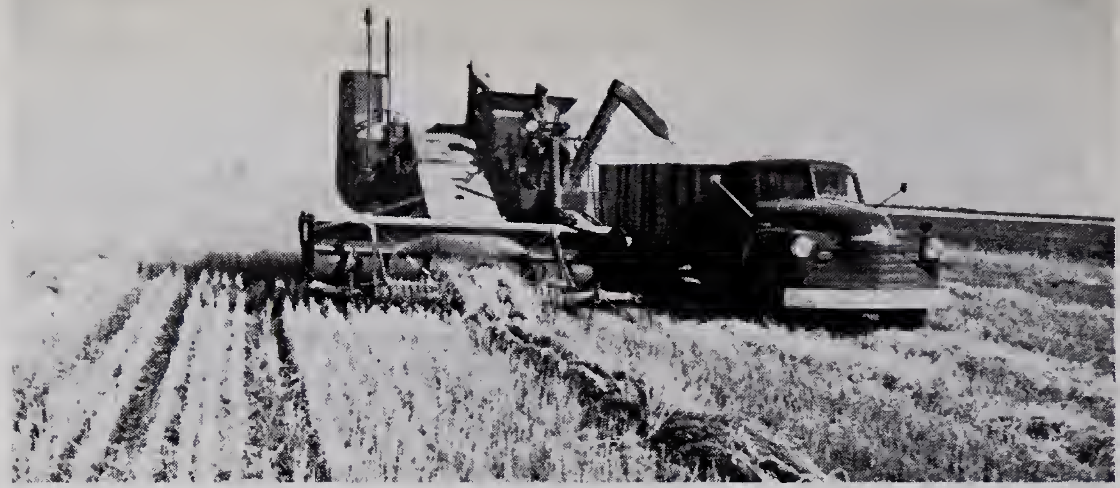
(b) Describe the relief of the land as it appears in the photograph.

(c) At which season of the year was the picture taken? Give reasons for your answer.

(d) Comment on the size of the fields. Are they fenced or unfenced? Does the photograph bear out what you learned about the size of Saskatchewan farms from studying Figure 7—2? How can you tell the size of these farms?

7—4 The village of Pense on the Saskatchewan Plains (National Film Board photo)





7—5 Harvesting on the Saskatchewan Plains near Regina (Saskatchewan Government photo)

(e) Account for the dark-colored fields. (Refer to the farm study in Chapter 6 again.)

(f) Which features in this photograph suggest that the Regina Plains are quite a dry region?

(g) Now study the village of Pense. Locate the C.P.R. line. What are the tall structures beside the tracks? How many are there?

(h) What **functions** does this small village perform for the surrounding area? Think of reasons why farmers come to Pense.

(i) Locate Pense again on the map in Figure 7—6. What is its elevation above sea level? How does the map confirm the striking flatness of the land?

(j) Describe two ways of reaching Regina from Pense, according to Figure 7—6. Which route would be less suitable in the springtime? Why?

5. In recent years, farmers around Pense have had no difficulty marketing their wheat. Due to huge sales of Canadian grain to Japan, China, and Europe, and because of severe droughts during the summers of 1960 and 1961, a shortage of grain has been threatened.

(a) Study Figure 7—5 which shows harvesting operations taking place. Review the information on harvesting given on page 269 of Chapter 6. To which place in Pense will the truck shown in Figure 7—5 take the grain that it receives from the combine?

(b) How will the grain be shipped from Pense? If the shipment is going to Japan, to which Canadian port will it be sent?

(c) Refer to an atlas and calculate the railway mileage from Pense to Calgary and Vancouver.

(d) Describe how the grain will be handled at Vancouver. Refer ahead to page 386 in Chapter 9, where the grain trade of that port is discussed.

(e) On a globe calculate the distance that a shipment of grain travels from Vancouver to Yokohama in Japan. What is the total distance of the journey from Pense to Yokohama?

6. Some grain from the Regina Plains is shipped to Europe via Churchill or Montreal.

(a) Calculate the distance by rail from Pense to Churchill.

(b) What is the distance by rail and water to Montreal?

(c) Where is the grain transferred from rail to water on the journey to Montreal?

(d) The opening of the St. Lawrence Seaway has reduced the cost of shipping Saskatchewan's wheat to Europe. Why is this so?

Regina, the "Queen City of the Prairies," is the capital and largest city of Saskatchewan and one of the major urban centres of Western

Canada. Its history and growth tell us much about the development of the Wheat Belt.

Early in 1882, "Pile O' Bones Creek" (now known as Waskana Creek) was selected as the site of the Indian Department of the Royal Northwest Mounted Police. The C.P.R. had already decided to erect a railway station where their main line was to cross the creek. Regina was chosen as the capital of the Northwest Territories (which then included most of Manitoba and all of Saskatchewan and Alberta) before it actually existed as a town. On August 23, 1882, the first train arrived at the future capital. On the same day, the little settlement was christened Regina, in honor of Queen Victoria. By the end of 1883, Regina contained a railway station, 19 stores, two banks, two large carriage shops, and four hotels. It also boasted a weekly newspaper. Since incorporation in 1903, the area of the city has expanded eightfold, and the population has expanded thirtyfold. When Saskatchewan became a province in 1905, Regina became the capital.

Until the end of World War II, Regina was primarily an agricultural centre. Between 1890 and 1913, thousands of settlers came from Europe and the United States to homestead on the Saskatchewan Plains. A homestead could be obtained for a fee of ten dollars. The survey system described in Chapter 6 was extended to Saskatchewan.

As settlement spread further west, such areas as Pense soon became occupied. Railway lines began to branch out. Regina soon became a distributor of farm machinery. Processing of agricultural products developed and the city began to provide many different services to its region.

The site and function of Regina

1. Study Figure 7—6.

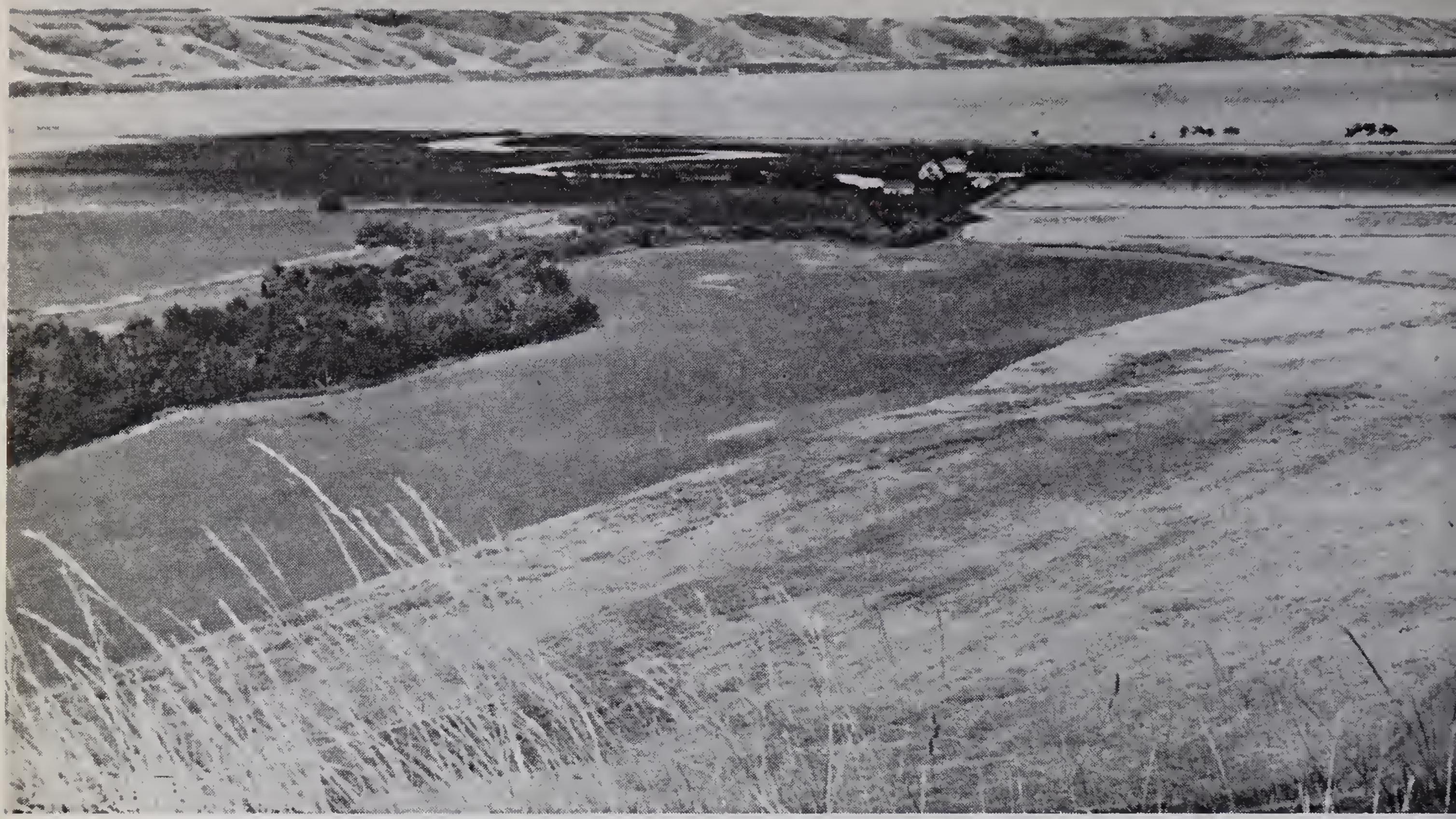
(a) How many railway lines radiate from Regina? Saskatchewan contains nearly one sixth of all Canada's railway mileage. What facts might help to account for this?

(b) In what way does the road pattern give us a clue to the relief of the land around Regina?

(c) Comment on the type and extent of the roads on this map. Saskatchewan contains more than one quarter of Canada's total road mileage. Why is such a dense road network necessary in this region of low population density?

(d) What other form of transportation serves the people of Regina?

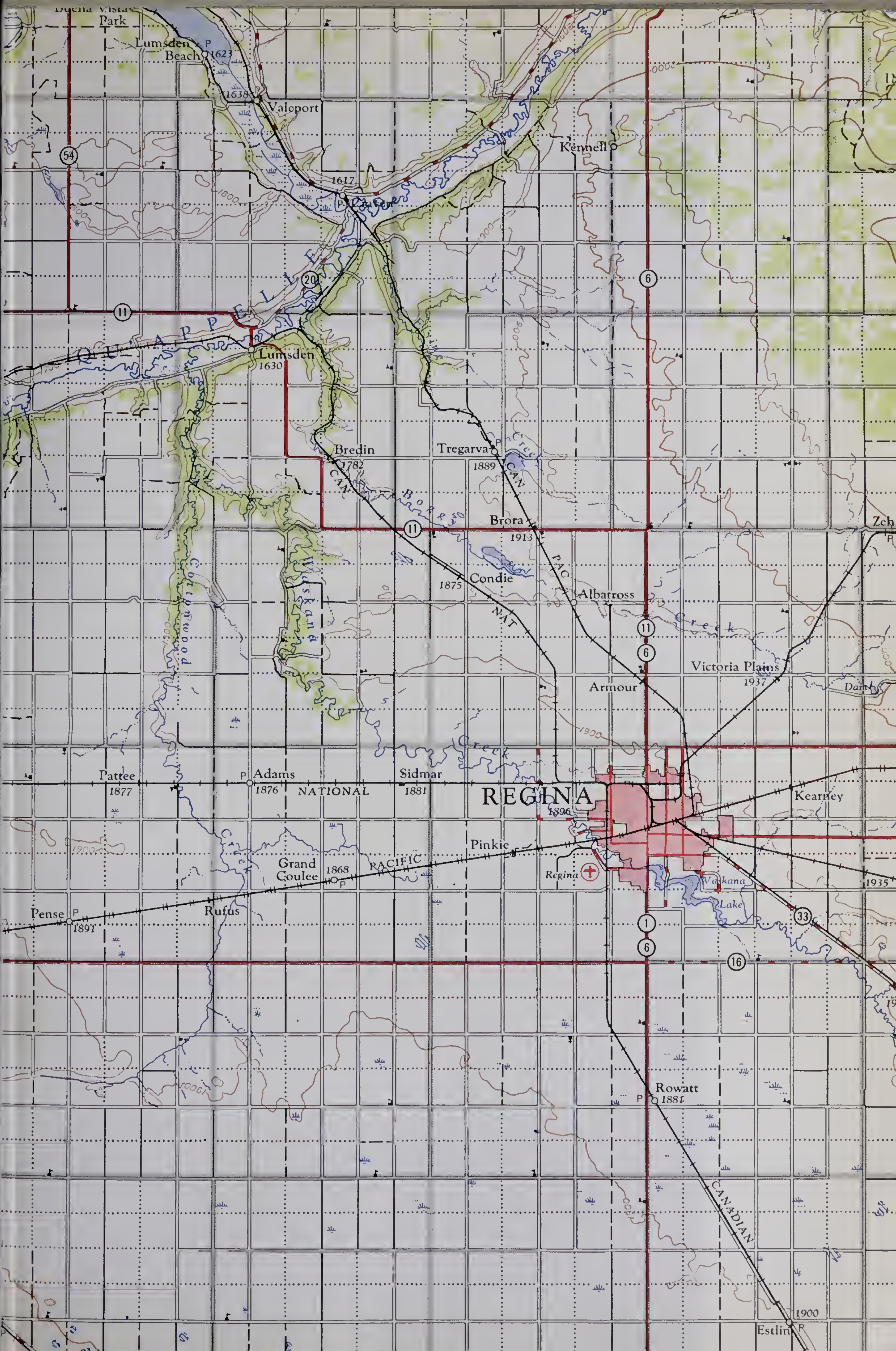
(e) Trace the course of the Qu'Appelle River on this map. Describe its course. How many feet below the prairie surface does it flow? Describe the relief of its banks. **Entrenchment** is a feature of many prairie rivers. Why was it easy for such rivers to cut deep valleys? What irrigation problem would the entrenchment of the rivers present in this dry country? Study Figure 7—7 which shows part of the entrenched valley of the Qu'Appelle. Compare this scene with the nature of the river as it appears on the map.

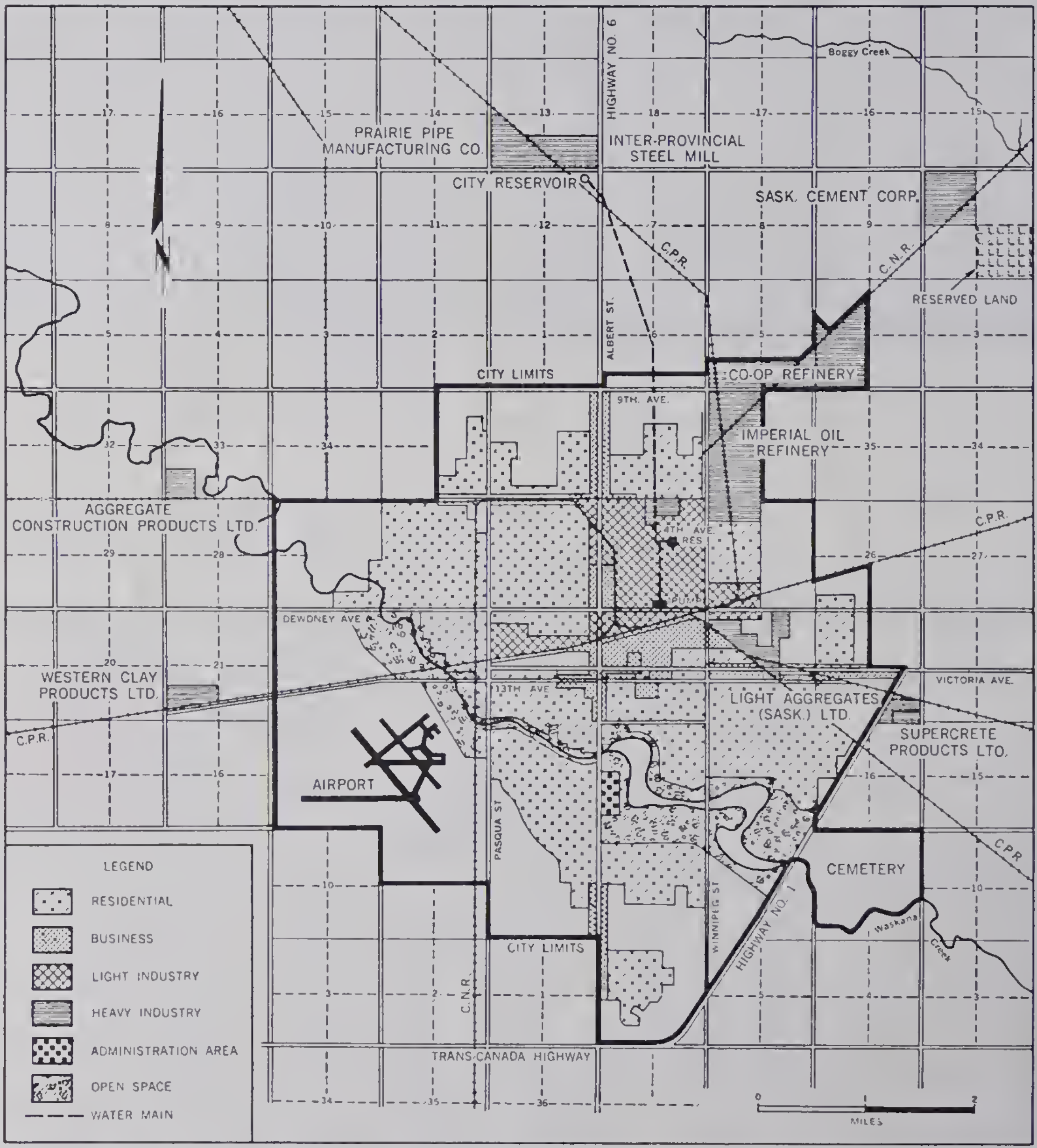


7—7 Scene in the Qu'Appelle Valley. How is the steep bank in the distance represented on the topographic map in Figure 7—6? (Saskatchewan Government photo)

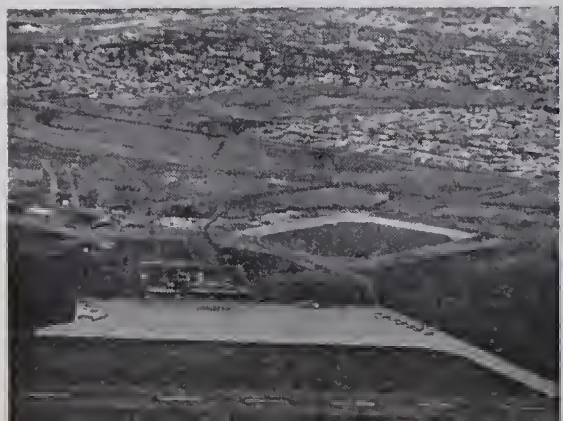
7—6 (opposite) A portion of the Regina sheet on the scale 1:250,000 (Sheet 72—I, National Topographic Series)

(f) What evidence is there of recreation facilities available to the people of Regina in the area north of Qu'Appelle River?
(g) Where is nearly all the wooded land concentrated on this map?
(h) What evidence of a dry climate is there on the map?
2. Figure 7—8 shows a land use map of Regina.
(a) In which section of the city are most of the industries concentrated?
(b) Where is the main residential area located?
(c) Study the location of the land shaded as "open space." Most of this is parkland. What natural feature has been used in planning this parkland?
(d) Make a list of important industries found at Regina, according to this map. Some of these industries are shown as inset photographs above and below the map. In which direction is the steel mill from the city? This is the first steel mill in Saskatchewan and will help to make Regina a major prairie industrial city. Name one product made from the steel produced in this mill.
(e) Regina is one of the major oil-refining centres of Western Canada. Study Figure 7—20 and Figure 8—24 and suggest the source of the oil used there. Gas is used as fuel for cooking.
(f) List other forms of land use not already mentioned. The administration area houses government offices and the Parliament Buildings.
3. Figure 7—9 shows an aerial view of Regina. In which direction was the camera pointing when the photograph was taken?
(a) Locate the Parliament Buildings near the centre of the photograph. They are situated on the shores of Waskana Lake which was formed by damming Waskana Creek.


Buena Vista Park
Lumsden Beach
1623
1638
Valeport
Kennell
54
1617
Craven
1800
1900
6
20
11
QU'APPELLE
Lumsden
1630
Bredin
1782
CAN
Tregarva
1889
Creek
CAN
Brora
1913
PAC
11
Boggy
Condie
1875
NAT
Albatross
Zeh
Cottonwood
Wascana
Creek
11
6
Victoria Plains
1937
Armour
Dam
1900
Creek
Pattee
1877
Adams
1876
NATIONAL
Sidmar
1881
REGINA
1896
Kearney
Pinkie
Grand Coulee
1868
PACIFIC
Regina
Wascana
Lake
1935
Creek
Pense
1891
Rufus
1
6
33
16
Rowatt
1881
CANADIAN
1900
Estlin



HIGHWAY NO. 6
Boggy Creek
PRAIRIE PIPE MANUFACTURING CO.
INTER-PROVINCIAL STEEL MILL
CITY RESERVOIR
SASK. CEMENT CORP.
C.P.R.
C.N.R.
RESERVED LAND
ALBERT ST.
CITY LIMITS
CO-OP REFINERY
9TH. AVE.
IMPERIAL OIL REFINERY
AGGREGATE CONSTRUCTION PRODUCTS LTD.
4TH AVE. RES.
DEWDNEY AVE.
WESTERN CLAY PRODUCTS LTD.
13TH AVE.
VICTORIA AVE.
LIGHT AGGREGATES (SASK.) LTD.
SUPERCRETE PRODUCTS LTD.
AIRPORT
PASQUA ST
WINNIPEG ST
HIGHWAY NO. 1
CEMETERY
Waskana Creek
C.N.R.
TRANS-CANADA HIGHWAY
LEGEND
RESIDENTIAL
BUSINESS
LIGHT INDUSTRY
HEAVY INDUSTRY
ADMINISTRATION AREA
OPEN SPACE
WATER MAIN
0
2
MILES

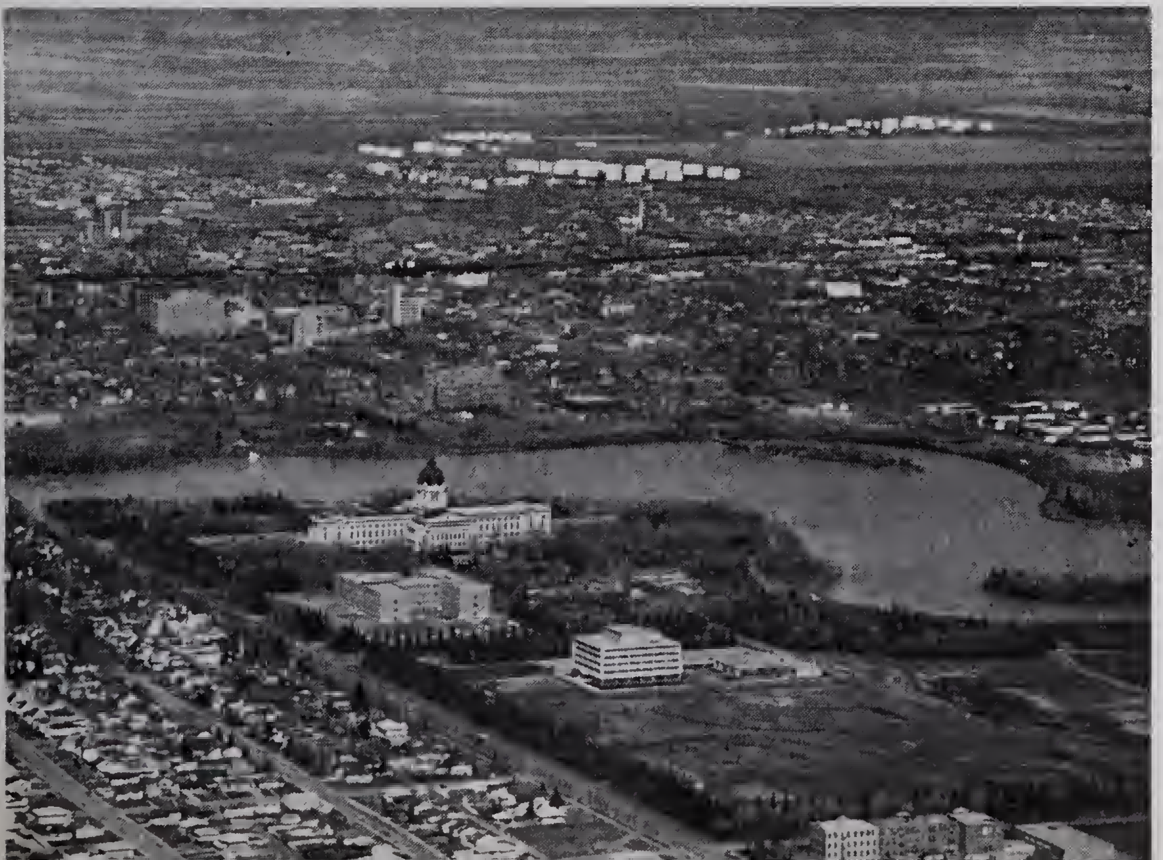


(b) Name the industry visible in the far distance in the photograph.
(c) Where is the main downtown district in relation to the Parliament Buildings?
(d) Locate the narrow, dark band that extends across the middle background of the photograph. This marks the course of the C.P.R
(e) Locate the buildings on the north bank of Waskana Creek, slightly east of the Parliament Buildings. These belong to Regina College, a branch of the University of Saskatchewan at Saskatoon. A huge new "University City" is being established to the southeast of the city.
(f) If you were standing at the Parliament Buildings facing the main business district, would the airport be to your right or to your left? In which direction does it lie from the Parliament Buildings?

In addition to the industries already noted, other important activities take place at Regina. It has flour mills and slaughterhouses, and remains an important distributor of agricultural machinery. A Dominion Government Experimental Farm is located near the city. Regina is still the headquarters of the R.C.M.P. List the functions of this important prairie city. According to the 1961 census, it had a population of 112,000. During the past 20 years Regina has changed from a city engaged mainly in servicing an agricultural area and in processing farm products to a major prairie centre. Try to account for its growth by referring to its functions, its location in relation to transportation routes, and by noting sources of energy available to it. Electricity for Regina is produced by steam plants burning lignite mined at Estevan to the southeast. Locate Estevan in Figure 7-1.

7—8 (opposite) Land use map of Regina (Courtesy City of Regina). Use the map to locate the industries shown in the photographs (top left, steel; top right, cement plant; bottom left, airport; bottom right, oil refinery).

7—9 Aerial view of Regina (Saskatchewan Government photo)



To the west of Regina, the Wheat Belt of the Saskatchewan Plains extends to the Alberta border. Settlement here proceeded as rapidly as around Regina after the railway came through. Moose Jaw, 42 miles west of Regina, has become the third city of the province, with a population of 33,000 in 1961. Like Regina, it is on the main line of the C.P.R. and on the Trans-Canada Highway. Oil and natural gas are easily available and the completion of the Saskatchewan River Dam will make cheap hydro-electricity available to this city, as to Regina. Located in the heart of the Wheat Belt, with the raising of cattle, sheep, and hogs of importance, Moose Jaw's main industries are based on agriculture. Large grain elevators and stockyards are maintained. Flour milling and the manufacture of cereals, bakery products, and animal feeds are important. Meat packing and the processing of poultry and dairy products are also carried on. Moose Jaw is a major oil refining centre in Saskatchewan.

Northwest of Moose Jaw lies Saskatoon, second city of Saskatchewan. Saskatoon was founded in 1882, but by 1903 had only 113 people. By 1911 the population had increased to more than 12,000. During the first decade of this century, Saskatoon was in the centre of the great migration to the Prairie Provinces. Today, it is a city of 95,000 people and the centre of a region that extends north into the forested belt and south into the Dry Belt. The story of the growth of this region from pioneer times illustrates very well the story of the growth of Saskatchewan as a whole. It is fortunate that many of the pioneers still live and that we have first-hand accounts of their experiences.

Most of the pioneer settlers came from Europe and the United States. The railway made the settlement of the Prairies possible. The account of the experiences of one family from Yorkshire in England, who arrived at Saskatoon in 1903, is fairly typical.* The Pinder family had been attracted to Saskatchewan by advertisements promising cheap transportation and free land. This is how Saskatoon appeared to them in 1903:

> There wasn't even a real station, only a small house and a long platform. A short distance ahead a few tents, round and small, crouched on the other side, and that was all.

From Saskatoon, the family had to make their way by horse and cart to their homestead near Battleford. Here is a description of life on the trail.

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*This account of pioneer settlements and the passages quoted are taken from *Gully Farm* by Mary Hiemstra and are reproduced here through the courtesy of Mrs. Hiemstra and McClelland and Stewart Ltd., Toronto.

> The trail, just two wagon tracks, wound casually across the prairie, skirting sloughs that were full of brown water, avoiding hills not yet green, and slipping around clumps of dark, stiff-looking trees. It went over badger-holes and stones, and the little mounds the gophers made. The steel-rimmed wheels of the springless wagons made the most of every hill and hollow, and the wagons creaked and swayed as they jolted over the ruts. . . . Occasionally, if we were lucky, we camped in one of the big tents that had been pitched over the trail for our use. They had wood floors and stoves for cooking, and when we stayed in them, Dad and Mother were saved the work of unloading and pitching the tent at night, and taking it down in the morning. . . . Our water for both drinking and washing came from the sloughs and an occasional stream. It was pale brown and tasted and smelled of dry grass.

A description of the Saskatchewan River brings out the nature of this famous Prairie stream in the springtime.

> The water was very high and fast. It was also very wide, almost like a lake, and small islands with trees growing on them were in the middle of the stream. . . . Although the Saskatchewan looked wide and serene, it was really very fast and treacherous. It created sandbars overnight, and then as quickly washed them away again. Sometimes it scooped out deep holes, and undermined the banks in unexpected places.

Compare this description with the photograph of the Saskatchewan River in Figure 7-16. How can you tell that the photograph was not taken in the springtime? What feature of the river mentioned in the above account is evident in the photograph?

Nowadays, with nearly all the Prairie under cultivation, few people have any idea of what it looked like in its original state. The following passages describe the prairie near Saskatoon as it appeared in 1903:

> There was no town at all at that stop, only prairie on both sides of the track. It was grey with last year's grass, and there seemed to be no end to it. There were neither trees nor willows, only grass that went on and on until it finally met the sky at the edge of the world.
>
> Canada was so awfully big. The town and the tents were mere dots on the vast prairie, and the grey, hostile sky was even bigger than the land. It seemed to go on and on forever: a huge lid that had somehow closed over us.
>
> There were few flowers in bloom while we were coming up the trail, for the spring was late, but when the flowers did appear Dad called my attention to them, and told me their names. . . . Trees and willow grew on the banks of the river, and the ploughs of the settlers had not yet disturbed the prairie. There were no roads and no fences, only the prairie rolling on for hundreds of miles like a vast, still sea.

What words in these passages bring out the nature of the prairies? Select words or phrases that emphasize the vastness and loneliness of the region. How has the scene, in the last passage quoted, changed since this description was written 60 years ago?

With the aid of a map, Mr. Pinder was able to locate the quarter section (160 acres) to which he was entitled under the homestead law. In order to gain full title to his land, every homesteader was required to meet the conditions set forth in the government regulations:

> The homesteader shall begin actual residence upon his homestead within six months from the date of entry and shall reside upon and make the land his home for at least six months out of every twelve for three years from the date of entry; and shall within the first year break and prepare for crops ten acres of his homestead quarter section; and shall within the second year, crop the said ten acres and break and prepare for crop fifteen acres additional, making 25 acres, and within the third year he shall crop the said twenty-five acres and break and prepare a further fifteen acres for crop.

During the first few months on their homesteads, prairie pioneers lived in tents. Then they built houses made of poplar boughs with sod roofs; some built houses made entirely of sod. A sodhouse has been described by a pioneer who built one near Swift Current, south of Saskatoon, in 1910:*

> To build a sod house, one must secure and cut the slabs for it from the sloughs where an abundance of grass is mixed with the earth, then carefully put together as a bricklayer lays his bricks, no cracks between, one slab overlapping the next. After all are placed and dry, the inside surface is smoothed and plastered with mud to make it chink proof and air proof.

This pioneer goes on to describe how his neighbors in their frame shacks "found my structure a most welcome spot during the 40 below zero weather we experienced week after week that winter." The climate provided some of the most frightening experiences to the pioneers. Thunderstorms occur frequently on the prairies in summer and are more intense than elsewhere. Much of the summer rain that is so important to the cultivation of grain falls during these storms. A description of a prairie thunderstorm may help you to understand what it is like:

> The next thing I knew the world that had been so quiet a while ago was full of screaming wind and crashing thunder. The tent canvas strained and shuddered and lightning so bright I could see it with my eyes shut, filled the tent. One flash was weird and ghostly green, followed immediately by a dazzle of bluish purple, then forked lightning like a pale snake slithered down the tent-pole, leaving a queer smell like sulphur matches behind it. I pulled up the blanket and tried not to look at the lightning.
>
> The flashes, however, were too bright to be ignored, and they were almost constant. There was also continuous thunder: great booming crashes that shook the earth, crackles as if all the glass in the world were breaking, and bangs like the firing of huge guns. The whole world full of sound. One crash followed another just as one blaze of green or purple light came on the heels of the glare just gone.

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*Quoted from *Golden Furrows*, published (1954) by the Local Council of Women on the occasion of the 50th anniversary of the incorporation of Swift Current, Saskatchewan.

> When it seemed as if the world must fall apart, hailstones began to fall. They thudded furiously on the tent, bounced and thudded again. Rain in torrents followed the hail.

While the rain that falls during such storms brings needed moisture to the grain crop, what dangers to the crop does such a storm also bring?

Many of the pioneers were quite unprepared for the winter. They wore only the light clothing they had brought from England, and lacked Canadian overcoats, earmuffs, winter footwear, and the like. Some were forced to live through their first winter in tents and were lucky to survive. The following passage describes winter conditions:

> (A blizzard) The growl in the wind increased to a roar. The wind threw snow against the window, then it roared off across the prairie, making a strange whoosh as it went through the bare branches of the frozen trees.... When he opened the door, a gust of wind heavy with snow almost knocked him off his feet. . . .
>
> After Christmas, the winter really began. . . . Soon after the new year, it dropped to fifty below, and hovered there for at least a month. . . .
>
> In the day-time, the air was clear, and so crisp it almost crackled. The smoke went straight up in a thick white column and sun-dogs, small false suns that looked like small round rainbows, shimmered frostily on either side of the real sun. . . . The sky was a dome of pale ice, and the snow was a sheet of white that glared in the cold sunlight. Against the snow, the frozen trees looked like etchings, dark, still, and dead.

The description of winter should be compared with the following temperature data for Saskatoon:

Temp. (°F.)	J	F	M	A	M	J	Jl	A	S	O	N	D
	0.8	4.6	18.7	38.4	51.8	59.8	66.4	63.2	52.5	40.6	21.1	7.4

Other interesting statistics for Saskatoon are as follows:

Frost-free Season	104 days
Total annual precipitation	14.4 inches
Annual snowfall	33.0 inches
Highest temperature on record	103.7 F. (June 24, 1941)
Lowest temperature on record	—55°F. (January 11, 1912)
Year with most precipitation	21″ (1921)
Year with least precipitation	8.84″ (1929)

What is the climate of west-central Saskatchewan like?

1. What are some of the features of the winter weather of west-central Saskatchewan, according to the description given above?

2. (a) How many months are below freezing at Saskatoon? Compare winter conditions here with those at Winnipeg by referring again to Figure 6—2.

(b) What is the annual range of temperature at Saskatoon? Again compare this range with that of Winnipeg. Describe summer temperature conditions at both places.

(c) Compare the frost-free season at Saskatoon with that at Regina and at Winnipeg.

3. (a) Compare the annual precipitation at Saskatoon with the figures for Regina and Winnipeg. What seems to be the trend of precipitation as one moves westward across the prairies?
(b) The high winds of the prairie winter make snowfalls seem worse than they really are. Does the annual snowfall of Saskatoon seem to bear this out? Compare the total with the snowfall in your neighborhood and in some of the large cities of southern Quebec and Ontario.

Hail, frost, and drought were hazards faced by the pioneer prairie farmers and are still faced by farmers in the region today. Special frost- and drought-resistant varieties of wheat have been developed. Especially important were the frost-resistant varieties that made it possible to grow wheat during a season of less than 100 days. Modern farm machinery has been a means of overcoming the short growing season. By enabling the farmer to prepare his fields and sow his crops more quickly, these machines have had the effect of lengthening the season by a few precious days.

In spite of difficulties and hardships, the prairie pioneers, like the pioneers of Ontario and Quebec before them, were able to survive and to tame a difficult country. Prairie settlement had many advantages that attracted the newcomers. These advantages included vast quantities of free land and an assured grain market resulting from the rapid growth of world population, especially in Europe where they were unable to grow enough for their people. The land was level and required little clearing, for trees, stumps, and stones were no problem. Farm machinery could be operated easily under such conditions. The steel plough had recently been invented and it broke the prairie sod fairly easily. The dark brown and black soils yielded excellent crops. These crops were easily moved to market by a growing rail network. Grain elevators such as those we noticed in Figure 7-4 began to appear in every prairie township. Farmers banded together to form co-operative organizations for the handling and marketing of their grain. Special vessels were constructed for transporting the wheat crop through the Great Lakes-St. Lawrence Waterway and overseas. Montreal, Vancouver, and other ports built huge storage elevators and installed special loading and unloading equipment. The development of the wheat trade stimulated the growth of every other part of Canada. Carrying wheat became the main freight business of the railways. The trade gave employment to thousands of men in the seaports of Canada. As an example of how Canada's wheat trade continues to assist our growth, we may note that in 1961 when millions of bushels of grain were shipped to China, it was estimated that $7,000,000 were paid in Vancouver to men handling the shipments.

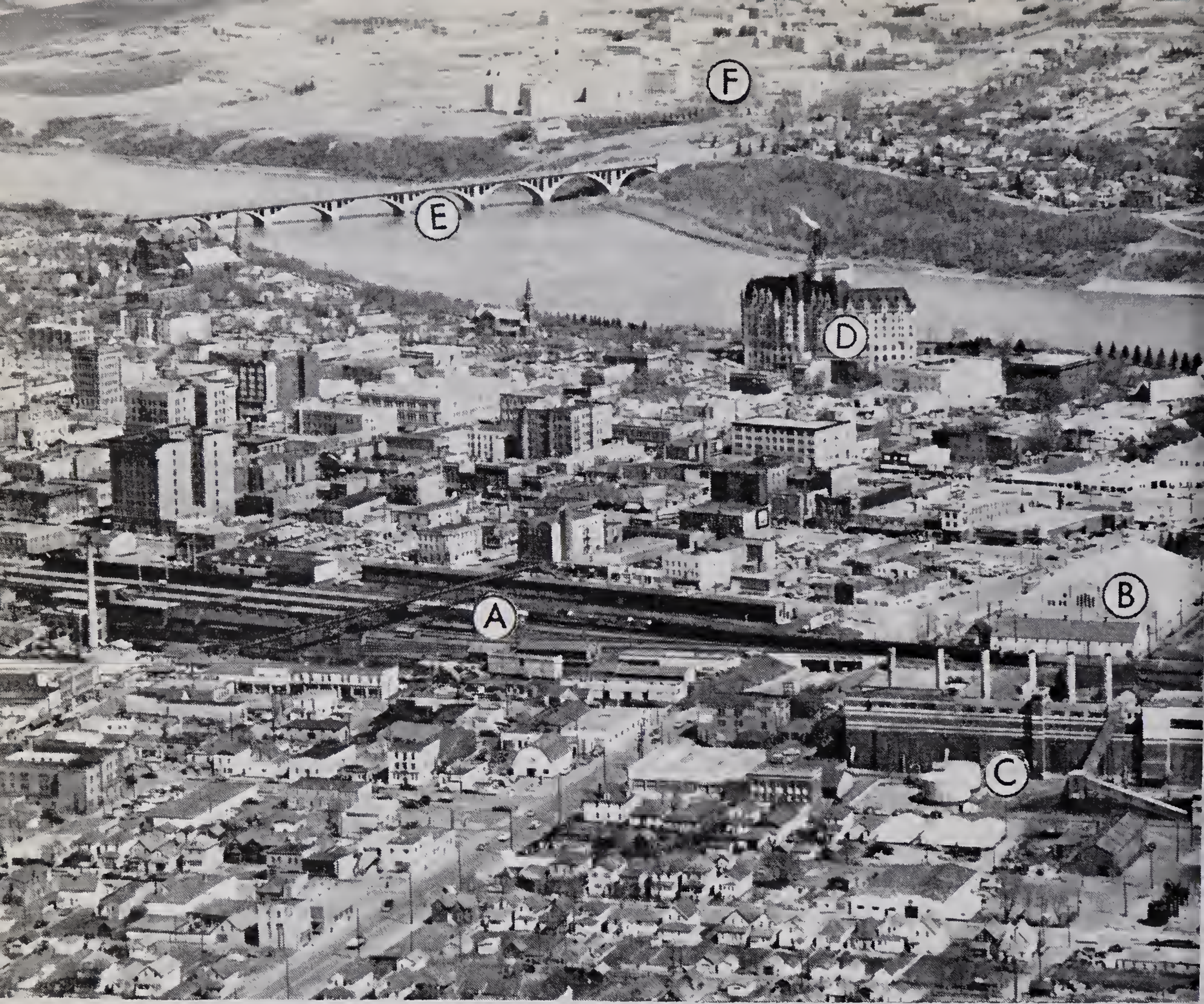
Some of the very advantages of the prairie for farming also caused serious problems for the early settlers. In a treeless land, wood was lacking for construction of houses, for fuel, for fencing, and for railway ties. Nearly all lumber had to be brought in from eastern Canada. In the United States, the invention of barbed wire solved the fencing problem and it is used throughout the grazing lands of the Canadian prairies today. The small villages and widely scattered farms made it difficult to supply services such as electricity. Many farms in Saskatchewan still lack electricity, although the need is now being met. Cheap hydro-electric power was not available. Suggest how the relief of the prairies explains the lack of hydro-electric power.

No handicap was (and is) greater than the lack of water. Fortunately, the invention of the windmill pump made it possible to sink deep wells. The entrenchment of prairie rivers such as the Qu'Appelle (as we noticed in Figures 7–6 and 7–7) makes irrigation difficult. The water problem was partly overcome by the system of dry farming that was described in Chapter 6. However, it has been estimated that only four "bumper" crops can be expected in any ten-year period. Moderate to severe droughts usually occur during several years of such a cycle.

By 1958, a number of bumper crops and declining overseas wheat sales had produced such a surplus of grain on the prairies that there was insufficient storage space for the crop. Since 1958, increasing wheat sales to Japan and China have reduced the surplus. At the same time, droughts, such as that in 1961, which was noted in Chapter 6, have reduced yields. In a good year, Saskatchewan farms may yield 23 bushels to the acre; in a poor year, they are not likely to exceed 15 bushels. By 1962, it appeared that there could be a serious shortage.

Since 1940, prairie farmers have tried to reduce their dependence on a single crop. With climatic conditions and markets so often uncertain, it is unwise to depend, for income, upon wheat alone. A greater variety of grains, the raising of livestock, and the cultivation of irrigated crops are hastening the development of a mixed-farming system. As we saw in Chapter 6, this system has gradually taken hold throughout much of the Manitoba Lowland. In both the Wheat Belt and the Dry Belt, mixed farming is becoming possible, as great irrigation projects such as the South Saskatchewan River Dam are developed. However, as long as the world demand for grain continues, there is no doubt that wheat will remain king in southern Saskatchewan.

The story we have sketched of pioneer settlement in the west-central area of the Saskatchewan Plains has seen Saskatoon develop into the large modern city mentioned earlier.



7—10 Aerial view of Saskatoon, showing (a) C.N.R. marshalling yards; (b) Civic Arena; (c) Generating Station; (d) Bessborough Hotel; (e) Bridge over the South Saskatchewan River; and (f) University of Saskatchewan campus (Saskatchewan Government photo)

Saskatoon

1. When the picture was taken, the camera was pointing almost due east. On which bank of the South Saskatchewan River has most of the city of Saskatoon grown up?
2. The presence of the university has made Saskatoon the leading educational centre of Saskatchewan. Where is the university located in relation to the city?
3. Describe the valley of the Saskatchewan River as it appears in the photograph.
4. What evidence is there that Saskatoon is an important railway centre?
5. Is the main source of electrical energy a steam or a hydro-power plant? By 1965, Saskatoon will be able to tap the power resources that will become available from the South Saskatchewan River Dam Project.

Saskatoon handles, by value, a greater amount of livestock in its public markets than the next three livestock centres of the province combined. It is the headquarters of the largest packing industry in the province. Nearly 2000 people are employed by the two railway lines that serve the city. Canada's first potash mine is located a few miles east of the city. The Saskatchewan Wheat Pool maintains a large vegetable oil plant in Saskatoon

THE DRY BELT

This corner of Southwest Saskatchewan occupies part of the third prairie level. It is the driest section of the Prairie Provinces. South of Swift Current, precipitation averages less than ten inches per year in many places. What type of vegetation originally covered this region? Figure 6-8 will help you to answer this question. The Dry Belt experiences higher summer temperatures than other parts of the Prairies. This means that such rain as does fall evaporates rapidly. On the Dominion Government Experimental Farm at Swift Current, it has been discovered that an exposed water surface evaporates during the May to August period at a rate three times that of the rainfall. More rainfall occurs in the hillier regions in the extreme southwest corner of the Dry Belt. The Cypress Hills, shown in Figure 7-11, are a rolling wooded region of lakes that form a major recreational resource for the people of Southern Saskatchewan. They exist like a huge oasis in the Dry Belt.

There are no strict limits to the Dry Belt. To the north, it merges gradually into the Wheat Belt as annual precipitation increases to 15 inches. Within the Dry Belt itself considerable wheat is grown, using dry farming methods. The largest grain farms on the prairies are found in this region. Most average at least 1000 acres in extent.

7—11 A scene in the Cypress Hills of Southwest Saskatchewan (Saskatchewan Government photo)

7—12 Notice the rich, dark prairie topsoil. (Saskatchewan Government photo)

During periods of drought, no other part of the prairies has suffered more than the Dry Belt. As the better lands of the Wheat Belt filled up, homesteaders entered the Dry Belt, and ploughed grassland that should never have been disturbed. During the period 1925-30, moisture conditions were good and the world demand for wheat was high. More and more land in the Dry Belt was brought under the plough. During the drought years of the 1930s, already described in Chapter 6, this "dust bowl" region almost became a desert.

It was partly to meet the crisis of the drought years that the Canadian Parliament passed the Prairie Farm Rehabilitation Act in 1935.* The aim of this act was to make the wisest use of available water resources and the most efficient use of the land of the prairies. During the past 25 years, prairie agriculture has been encouraged in many different ways. Farmers in the Dry Belt have been taught to control soil drifting and erosion and to conserve moisture by strip cropping and summer fallowing methods. The construction of shelter belts of trees has also controlled soil drifting. By such means the precious topsoil is now being saved. The dark top layer, shown in Figure 7-12, is seldom more than six inches deep. It is Saskatchewan's most valuable natural resource.

Land in the Dry Belt formerly sown to wheat has been restored to permanent grass and is used for grazing. In Manitoba and Saskatchewan, 68 community pastures were operated by the P.F.R.A. in 1961. More than 7000 farmers were able to graze their livestock on these pastures. They were thus able to devote all their time to the

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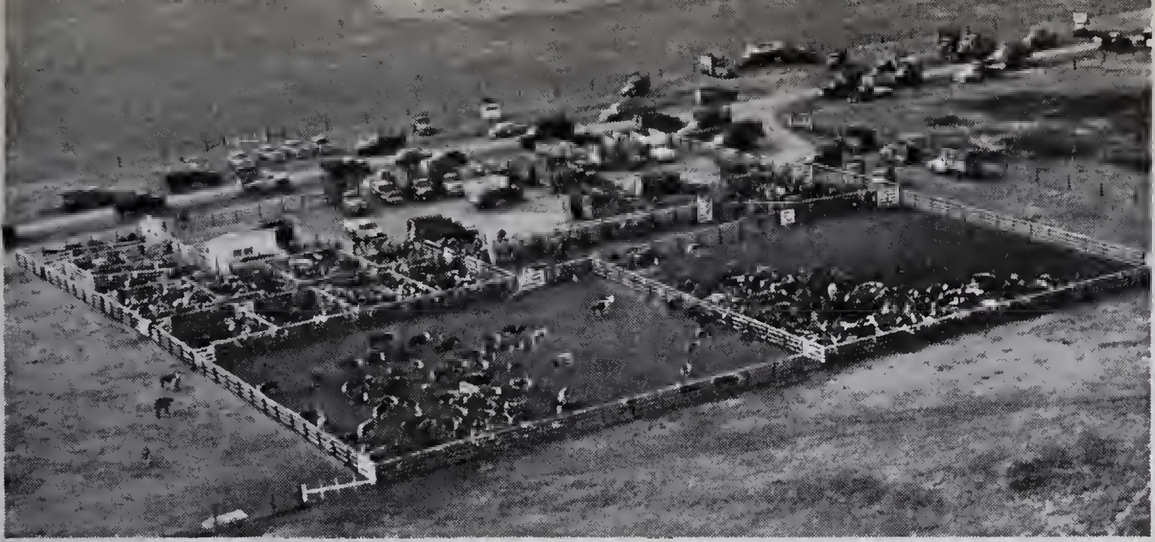
*Information on the Prairie Farm Rehabilitation Administration is based on Publication No. 1138 of the Canada Department of Agriculture, Ottawa. Entitled "P.F.R.A.—The Story of Conservation on the Prairies," this publication, which appeared in October, 1961, contains a wealth of material and photographs.



7—13 Rounding up cattle on a community pasture in the Dry Belt (Prairie Farm Rehabilitation Administration photo)

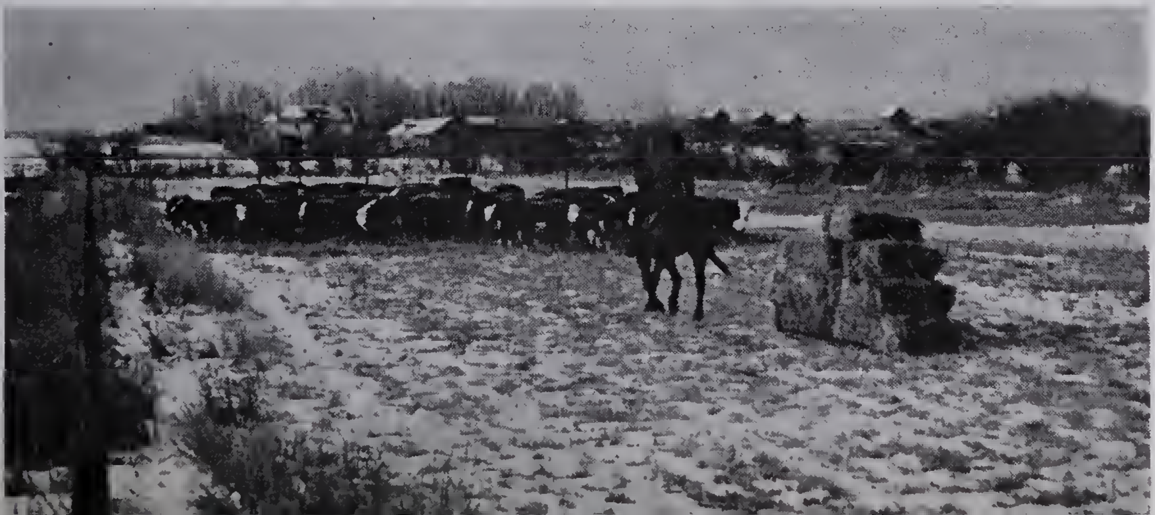
cultivation of crops on their own land. Figure 7-13 shows cattle being rounded up on a community pasture in southwestern Saskatchewan. What are the wooden enclosures called? What other kind of fencing material is used? Where will the cattle be taken? How will they be transported? Describe the relief and vegetation of this part of the Dry Belt.

The cultivation of fodder crops such as alfalfa has proved successful in the Dry Belt. Community dams and dugouts have been built. Individual farmers have also been assisted to store water for stock, irrigation, and domestic use.

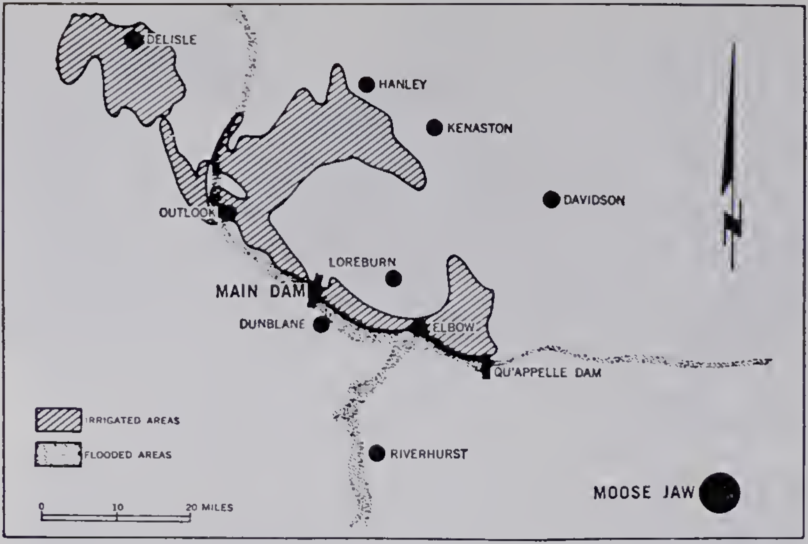
The ranching area of the Dry Belt of Saskatchewan looks much like that of Alberta, as shown in Figure 8-2 and discussed in Chapter 8. Figure 7-14 shows hay, grown in summer under irrigation, being distributed to cattle on the winter range. Comment on the snow cover here. Although temperatures here are lower in winter than in many parts of eastern Canada, cattle can graze outdoors. Why would this not be possible in eastern Canada?

The Prairie Farm Rehabilitation Administration has been responsible for some of the major conservation achievements of Canadian history. By 1965 it will have completed the greatest project it has ever undertaken. This is the South Saskatchewan River Dam, which is being built with funds provided by both the Canadian and the Saskatchewan governments. Let us investigate.

7—14 Cattle on the winter range in the Dry Belt (P.F.R.A. photo)



7—15 Sketch map of the South Saskatchewan Dam area



The South Saskatchewan River Project

1. Refer to an atlas or wall map.

(a) Name the two branches of the Saskatchewan River. Name an important prairie city located on each branch. What great mountain range contains the headwaters of the Saskatchewan River?

(b) Locate the Oldman and Bow rivers. Where do they meet to form the South Saskatchewan?

(c) Where do the North and South Saskatchewan rivers meet?

(d) Where does the Saskatchewan River have its mouth? A large delta has been built up here. Describe how the waters of the Saskatchewan finally reach the sea.

7—16 Aerial view of the South Saskatchewan Damsite (P.F.R.A. photo)

2. The great project is located between Swift Current and Saskatoon. Note that the area includes parts of the Dry Belt and the Wheat Belt. The Indian name for the Saskatchewan River means "flows swiftly." Compare this with the description on page 307.
3. Figure 7—15 locates the South Saskatchewan River Project on a larger scale.
(a) Between what two villages will the main dam be located?
(b) In which direction from the main dam will the Qu'Appelle Dam be located? The Qu'Appelle is the river you studied in Figures 7—6 and 7—7. It flows eastward, but is being dammed near its headwaters to assist in forming the reservoir for the South Saskatchewan River Project. Otherwise, the water impounded by the main dam would flow into the Qu'Appelle Valley.
(c) What do the shaded areas represent on this map?
4. Figure 7—16 provides an aerial view of the South Saskatchewan Project Area.
(a) Which feature of the river is very noticeable in this photograph? Refer again to the description on page 307.
(b) The photographer was facing south as the photograph was taken. The Saskatchewan River here follows a general northward course. Throughout this course, many coulees are to be seen. A coulee is an old channel, probably carved by meltwater from a former glacier. Locate a coulee in the right middleground of the photograph.
(c) Study the streams that flow into the Saskatchewan River from the left. In this photograph they have almost dried up. Describe how they have eroded the prairie.
(d) Describe the relief of the land in the photograph. What use is being made of most of it? What method of farming is being carried on here?

When completed, the South Saskatchewan River Dam will be 210 feet high and more than three miles long. The reservoir will be 140 miles long and will include 500 miles of shoreline. Immense quantities of hydro-electric power will be generated — the first to be produced on the Saskatchewan Plains. The power generated there and at other projects to be constructed downstream will provide cheap electricity to the province and greatly assist the further industrial development of Regina, Saskatoon, and other centres.

The major purpose of the project is to provide irrigation water on a large scale. Pumping station, canals, and secondary reservoirs will be built. Eventually, it is hoped that 500,000 acres of land may be irrigated. Some of this land will be on more than 1000 existing farms; in addition, it is expected that 1000 new farms will be created. Crops and farming practices generally will be very similar to those of the irrigated areas already developed in Alberta. These are described on pages 329-335 of Chapter 8.

The South Saskatchewan Project will promote a mixed farming system throughout the western part of the Wheat Belt and within the Dry Belt. Living standards will be improved and the population of towns and cities will increase as new demands for services and industries are created. The reservoir formed by the project will be a major new recreational resource for the people of the province. New provincial parks, forest preserves, and wild life sanctuaries will be formed.

THE MIXED FARMING BELT AND THE PIONEER FRINGE These two agricultural regions of north-central Saskatchewan will be considered together. The Mixed Farming Belt should be located in Figure 6-8. With which soil and vegetation zones does it correspond? The "park belt" is a zone of prairie grass and scattered trees. The centre of the Mixed Farming Belt is Prince Albert, shown in Figure 7-1. On which river is it located?

What does the landscape of north-central Saskatchewan look like?

1. Figure 7—17 is located in the Mixed Farming Belt near Prince Albert. In the foreground of the picture is the Skotheim farm, established in 1933 by Mr. Skotheim.

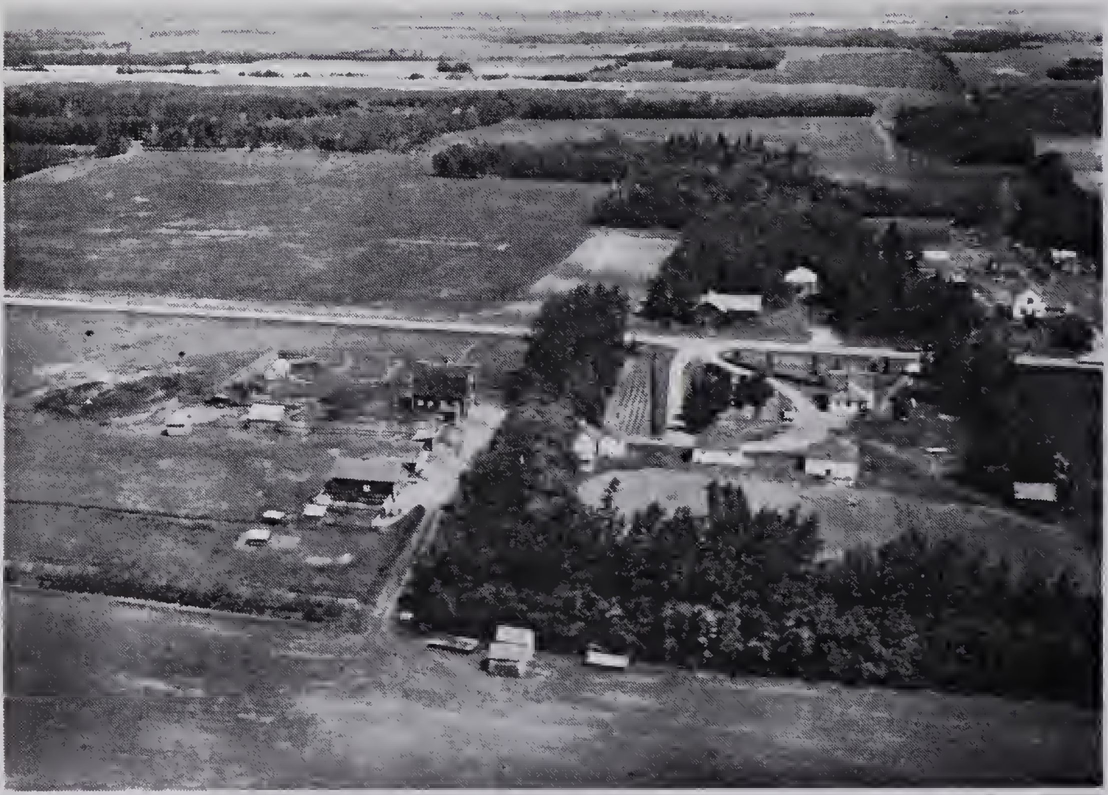
(a) Find the original farmhouse at the extreme right in the photograph. The present farmhouse is beyond it and to the left.

(b) What purpose is served by the trees in the foreground?

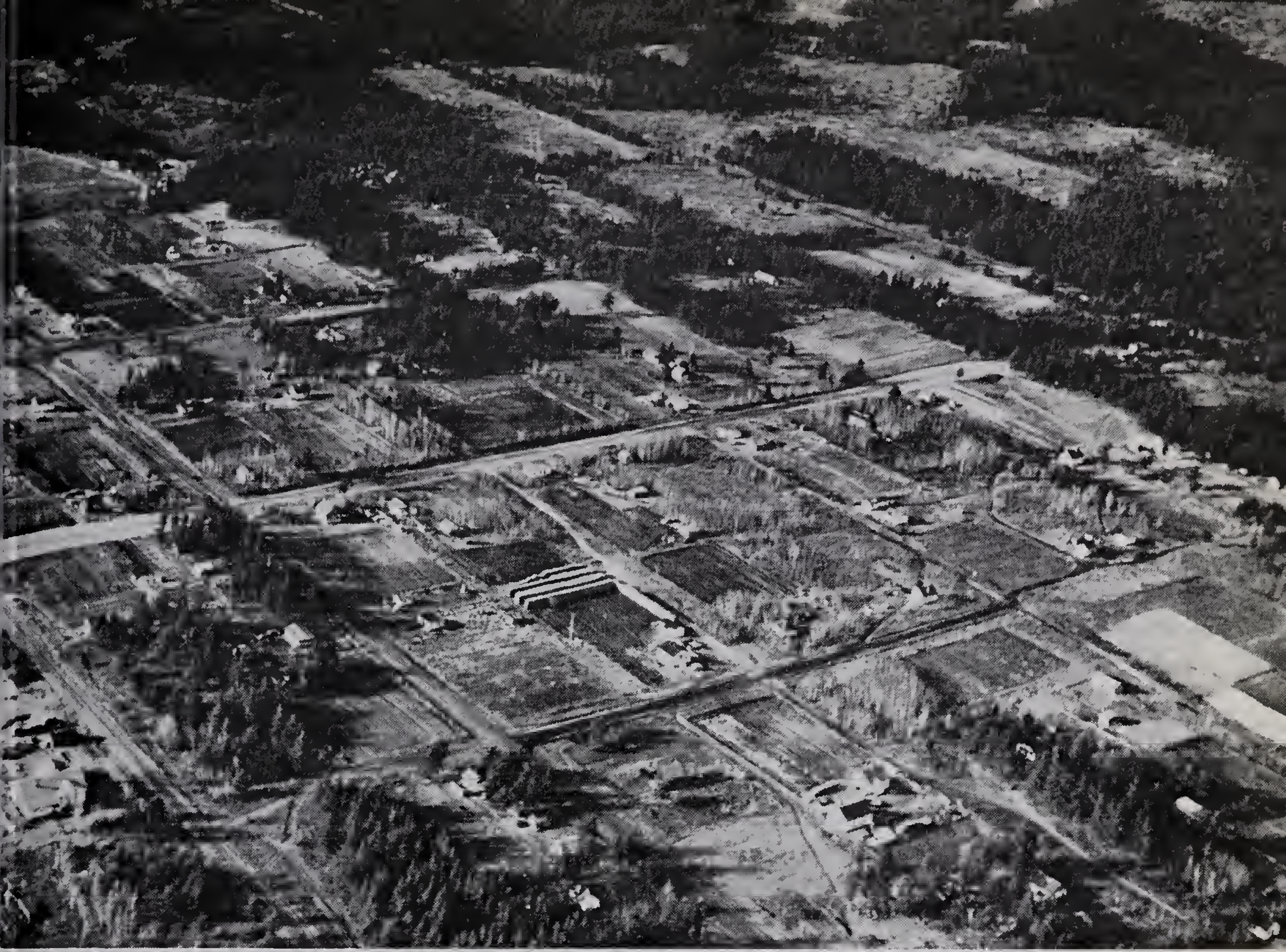
(c) Describe the relief of this land.

(d) Compare the vegetation and field patterns of this land with those of an area in the Wheat Belt such as you studied in Figure 7—4.

(e) How does the rainfall in this region probably compare with that of the Wheat Belt?



7—17 Aerial view of Skotheim Farm near Prince Albert (Saskatchewan Government photo)



7—18 Pioneer farmlands north of Prince Albert (National Film Board photo)

2. Figure 7—18 shows a farming region in the "Pioneer Fringe," well north of Prince Albert. This is really an extension of the Mixed Farming Belt and forms part of the Canadian Shield area of Northern Saskatchewan.

(a) How can you tell that this is a pioneer area?

(b) In what ways would the pioneering there be more difficult than in the Wheat Belt?

Wheat is still important in the Mixed Farming Belt, but begins to give way to stock-raising, including both dairy and beef cattle, as well as hogs. Fodder crops are important, and coarse grains are raised for animal feed. Precipitation is less reliable in this part of Saskatchewan. The soils are poorer and the growing season shorter than in the mixed farming areas of Manitoba. There is much available land towards the delta area of the Saskatchewan River, but it needs to be drained. Drainage is costly on such marginal land.

Check Figure 6-8 again. With which vegetation and soil zones does the Pioneer Fringe area of Saskatchewan correspond? The mixed forest of this region marks the beginning of the Canadian Shield. Soils here are thin and acidic, like those of northern Quebec and Ontario. The growing season seldom exceeds 80 days, although this is partly offset by a long summer day. The new frost-resistant varieties of wheat that have been developed have permitted the margin of grain cultivation to be pushed this far north. The greater emphasis, however, is on the growing of coarse grains, such as rye, and on livestock raising, as in the Mixed Farming Belt.

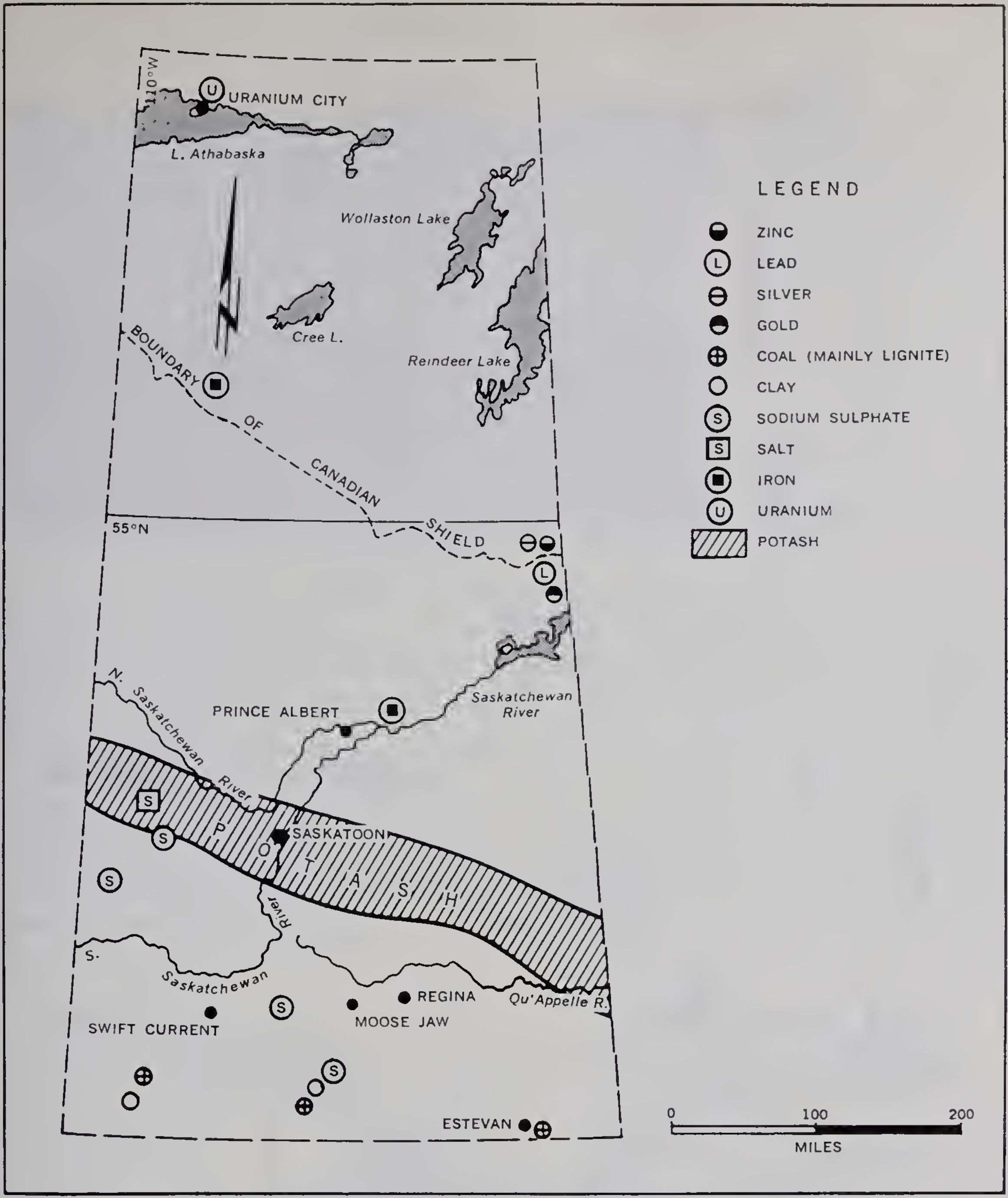
Prince Albert is the chief centre of the Mixed Farming Belt, and the gateway to Northern Saskatchewan. Founded in 1886, it became an important centre in 1891 when the railway arrived. Today, with 24,000 people, it is the fourth largest city in the province. It is an important centre for both major Canadian railways. Prince Albert functions as a regional capital for the northern part of the province and is the headquarters of the provincial government's Northern Administration Department. Located on the edge of the forested lake-covered Shield, near the heart of the finest fish and game country in the Prairie Provinces, the city is a natural tourist centre. A meat-packing plant, capable of handling more hogs than any other in Canada, gives employment to several hundred men. Recently, Saskatchewan's first major pulp mill was opened at Prince Albert. When fully developed, it will employ 3000 people.

NON-AGRICULTURAL RESOURCES AND INDUSTRIES OF SOUTHERN SASKATCHEWAN

Although no important metallic ores are known in Southern Saskatchewan, many rock formations contain clays, mineral salts, and other materials laid down when ancient inland seas and glacial lakes existed. Refer again to Figure 7-8 and name two or three industries in Regina that might be based on such mineral formations.

Figure 7-19 shows the distribution of various minerals except oil and natural gas in Saskatchewan. Where is coal found? This coal is actually lignite, a brown coal of poor quality. However, it is very easily mined by surface methods. In 1958 a huge machine, weighing more than 1600 tons, was put into operation in the lignite fields. Working like a giant steam shovel, it has bucket capacity of 35 cubic yards. This machine removes the surface material or overburden beneath which the lignite lies. In 1959 Saskatchewan lignite miners produced an average of more than 23 tons per man per eight-hour shift. Most of the lignite is used to heat steam plants that produce electricity for Regina, Saskatoon, and other centres. Some is sold in Manitoba and Ontario for the same purpose. Locate steam-power plants using lignite in Figure 7-20.

Clay deposits are distributed widely throughout Southern Saskatchewan. No Canadian province produces more clay in greater variety. The cement factory at Regina uses local clay. Other uses include clay for pottery and for brick-making.

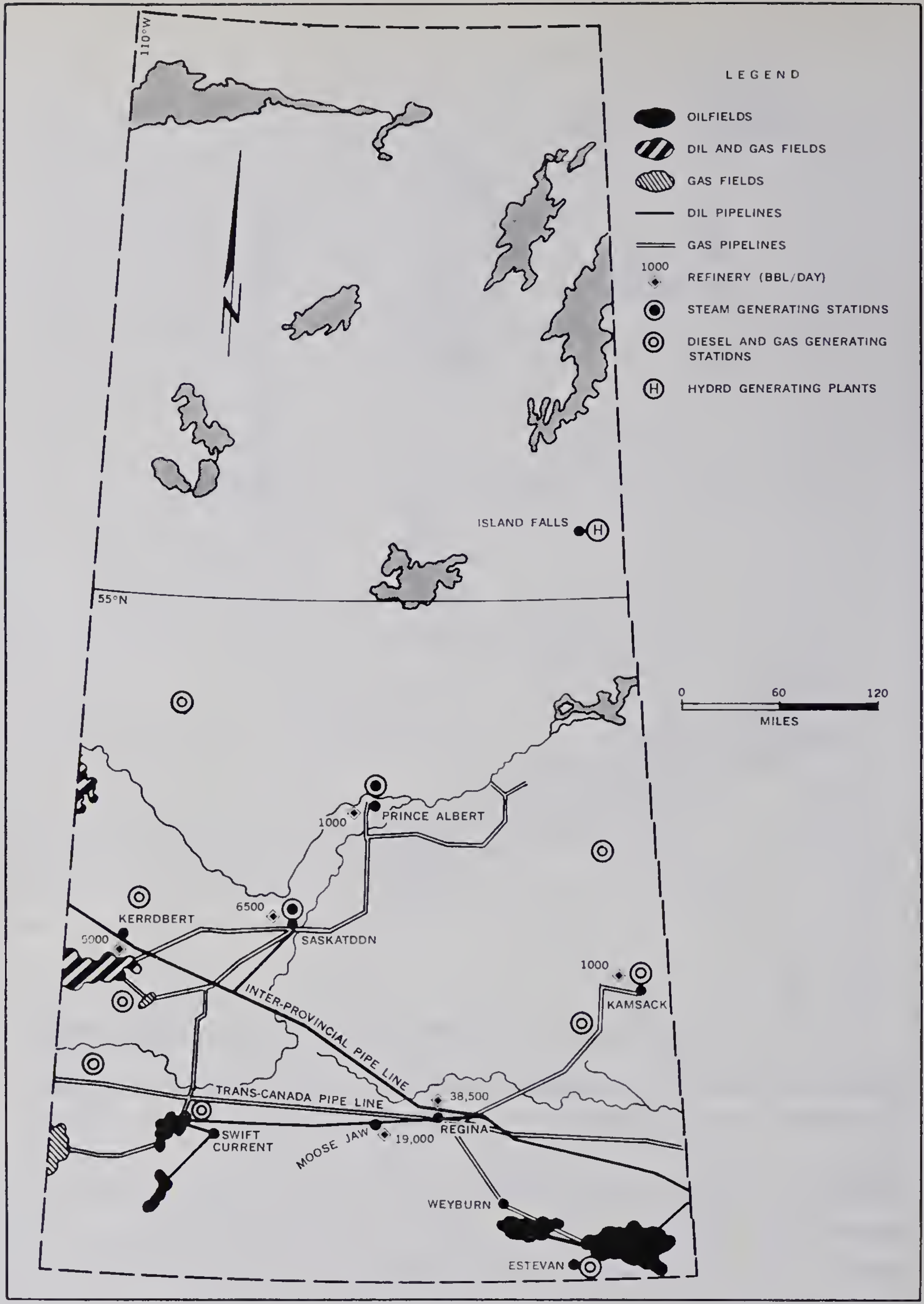


7—19 Minerals of Saskatchewan (for oil and natural gas fields see Figure 7—20)

Where is sodium sulphate found in Saskatchewan, according to Figure 7-19? The province is Canada's only commercial source of sodium sulphate. This mineral salt is used almost entirely in the making of paper and newsprint. It also has some use in the manufacture of glass, heavy chemicals, detergents, and dyes.

The world's greatest deposits of potash occur in central Saskatchewan. Describe the location of the potash belt, according to Figure 7-19. Most of the output is used as fertilizer. Some is employed in the making of chemicals, synthetic rubbers, munitions, and special aviation gasolines.

Locate a major salt deposit in Saskatchewan in Figure 7-19. The mining and processing of this and other minerals already discussed give employment to several thousand people in Saskatchewan. These

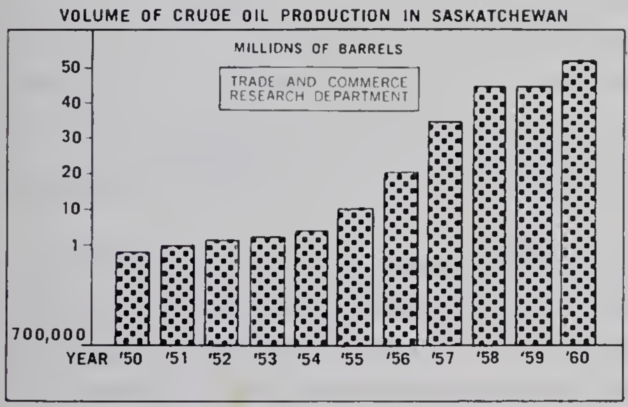


7—20 Sources of energy in Saskatchewan. Early in 1963, a new hydro-electric power station opened at Squaw Rapids, 125 miles east of Prince Albert.

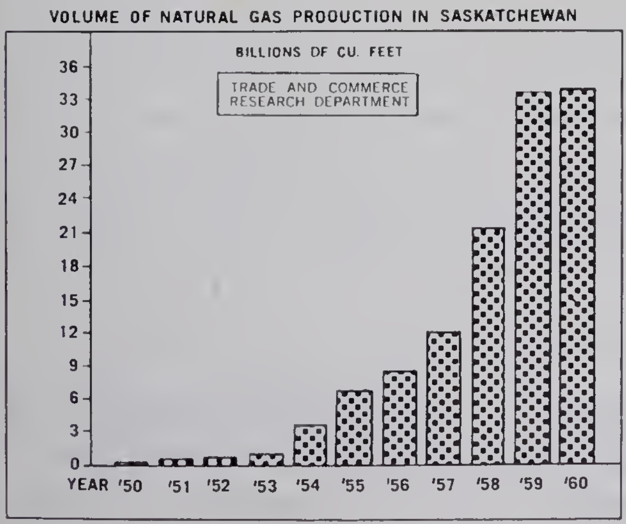
developments, since World War II, have enabled the province to reduce its dependence on grain as the sole source of income. Another encouraging development has been the discovery of the province's first major iron ore deposit. Locate this deposit in Figure 7-19. Already plans are being made to supply ore to the steel mill at Regina. At present the mill uses scrap iron.

7—21 Oil pump on ranch in the Dry Belt in the Gull Lake area (Saskatchewan Government photo)

None of the mineral developments so far discussed can compare with the oil and natural gas industry in importance. In 1958 oil refining surpassed flour milling in importance as Saskatchewan's major processing industry. The oil industry now employs nearly 8000 people. Many other industries, such as the manufacture of chemicals, are growing due to the availability of natural gas and oil. Figure 7-21 shows a familiar scene at Gull Lake in Southwest Saskatchewan. Here grain elevators and an oil pump stand near each other. Oil pumps are also likely to be seen surrounded by cattle in a pasture field.

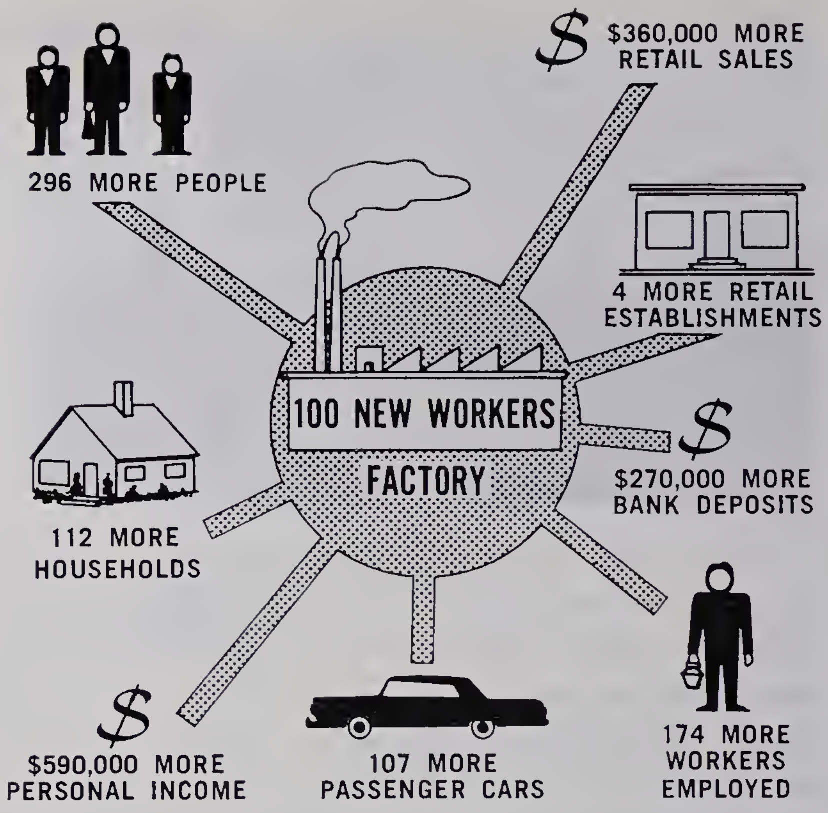


7—22 Volume of crude oil production in Saskatchewan, 1950-1960. Between 1947 and 1950, production ranged between 700,000 and nearly 1,000,000 barrels.



7—23 Volume of natural gas production in Saskatchewan 1950-1960

7—24 What 100 new factory workers mean to a community


296 MORE PEOPLE
$360,000 MORE RETAIL SALES
4 MORE RETAIL ESTABLISHMENTS
100 NEW WORKERS
FACTORY
$270,000 MORE BANK DEPOSITS
112 MORE HOUSEHOLDS
$590,000 MORE PERSONAL INCOME
107 MORE PASSENGER CARS
174 MORE WORKERS EMPLOYED

Oil and natural gas developments in Saskatchewan as at April 1, 1961

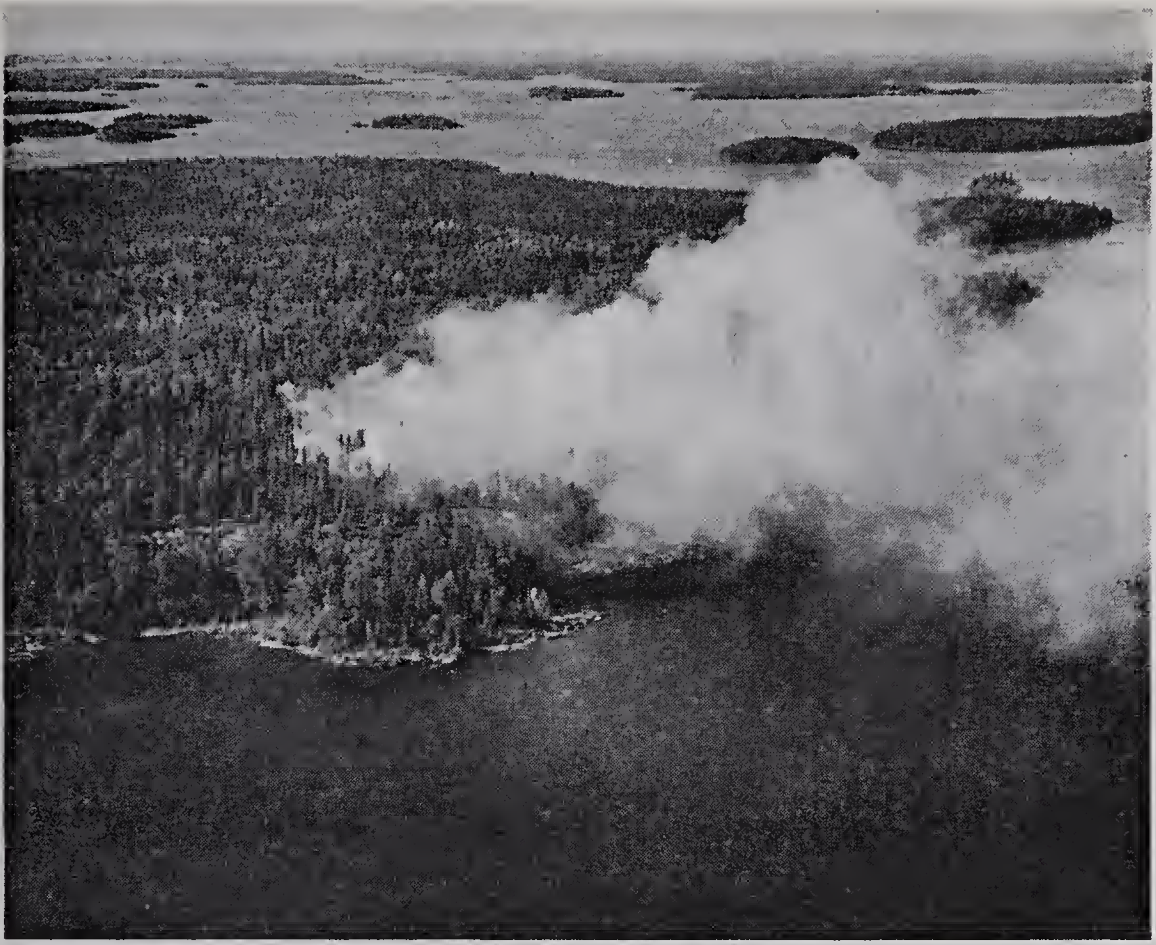
Refer to Figure 7—20.

1. (a) Where are the two major areas of oil production located?
(b) Where is natural gas production concentrated?
(c) Name the major centres associated with the oil and natural gas fields referred to in your answers to the above.
2. Where is the largest refinery area in Saskatchewan? Name five other centres where oil is refined.
3. Name two pipelines of national importance that cross Saskatchewan.
4. Figures 7—22 and 7—23 show how oil and natural gas production has increased over the years.
(a) Describe the increase in oil production between 1950 and 1960.
(b) Describe the increase in natural gas production during the same period.
5. In western Saskatchewan, steam plants producing electricity burn diesel oil or natural gas. Where are these plants located, according to Figure 7—20?

The industrialization of Saskatchewan is one of the most important developments taking place in the Prairie Provinces today. Some idea of what it means in terms of increasing wealth may be gained from a study of Figure 7-24. This chart shows how the opening of a factory employing 100 workers brought greater prosperity to a town in Saskatchewan.

SASKATCHEWAN'S NORTH

As in Manitoba, the term "prairie" is a poor one when applied to a province that is mostly forest-covered. Although Southern Saskatchewan is the heart of the Canadian Prairies, even in this province



7—25 A forest fire in one of the great forests of Northern Saskatchewan (Saskatchewan Government photo)

half the total land area is forest-covered. Most of this forest cover is found in the Canadian Shield. The extent of the Shield in the province is shown in Figure 7-19. From your studies of other Shield areas, what resources would you expect to find there?

Land and water in Northern Saskatchewan

1. Figure 7—25 shows a scene in Northern Saskatchewan where a forest fire is raging. Such fires are often fought by the province's famous smoke-jumpers, daring firefighters who parachute into areas like this in an effort to save the forest.
(a) What are the chief features of this landscape?
(b) Comment on the type and extent of the trees.
(c) Lumbering is of growing importance in the region. Where is the nearest market for pulpwood?
2. The Gunnar Uranium Mine is one of three near Lake Athabaska in Northern Saskatchewan. Locate Uranium City on the map in Figure 7—19.
3. Figure 7—26 shows two fishermen at work at Lac La Ronge in Northern Saskatchewan.
(a) Which season is this? A great deal of fishing is done at this time in the Prairie Provinces.
(b) What method are they using to catch fish? Commercial fishing is a major industry of Northern Saskatchewan. Whitefish, pike, and trout are among the main species caught.

7—26 Indians fishing in winter in Northern Saskatchewan at Lac La Ronge (Saskatchewan Government photo)

Sport fishing attracts many people from the United States and gives employment to guides, hotel keepers, and others. New roads have been built into the north to assist the commercial fishing and tourist industries. Fur trapping is another important source of income in the region. The government has promoted a big fur conservation program. In 1944 less than 500 beaver were trapped; in 1958 more than 46,000 pelts were obtained.

Uranium prospecting boomed in the Lake Athabaska region in 1952 when 4000 claims were staked. By the end of 1953 more than 18,000 claims had been staked. In 1957 three mills for processing uranium ore were in operation. More than 2000 tons of ore per day was being handled. A new, fully-planned town of 2500 people sprang up on the shores of Lake Athabaska. However, Uranium City began to lose population in 1959 and 1960 when one uranium mine and mill closed down. This was because British and United States markets for uranium began to decline. Where in Ontario did the same situation create unemployment and other problems in a new mining area? It is hoped that increasing Canadian demand for uranium by 1970 will keep the Lake Athabaska mines operating.

The other major mining project in Northern Saskatchewan is associated with Flin Flon in Manitoba. Review pages 290-294 in Chapter 6 and study Figure 6-7 again. Nearly 90 percent of the ores processed at Flin Flon are produced on the Saskatchewan side of the border. Lead, zinc, silver, and gold are the chief minerals found here. The hydro-electricity for the Flin Flon development is produced at Island Falls, in Saskatchewan. Locate this important installation on the map in Figure 7-20.

Fish, furs, forests, water power, and minerals provide Saskatchewan's North with a great abundance and variety of resources. There is no doubt that the region has possibilities for development as great as many settled areas of the Canadian Shield in Quebec and Ontario. However, farmland is almost entirely lacking and there will be difficulty in producing food for new settlements. The region is unlikely ever to have a large population, but its resources will contribute to the industrial growth of the rest of Saskatchewan.

A last look at the land of the big sky

1. What are the four main characteristics of the geography of Saskatchewan?
2. Write a paragraph on each of the following topics:
   Saskatchewans's changing farm economy
   The importance of the wheat trade to Canada
   The mineral wealth of Saskatchewan
   The forest wealth of Saskatchewan
   Industry comes to Saskatchewan
   Conservation in Saskatchewan
   The future of Saskatchewan's North
3. Why is the title "Land of the Big Sky" a good one?
4. Why is agriculture always likely to be a dominant source of wealth?
5. Why are most people likely to continue to live in the southern part of Saskatchewan?

CHAPTER 8

Alberta: Great Wealth from Nature's Bounty

During the 1950s, Alberta became the fourth Canadian province with more than 1,000,000 people. In 1961, for the first time, Alberta showed a rate of growth (over the previous census, 1956) greater than that of any other province. This sensational rate of growth is shown in the following figures for the two major cities, Calgary and Edmonton, during the decade 1951-61:

	1951 Population	*1961 Population*
Calgary	142,315	279,062
Edmonton	176,782	337,568

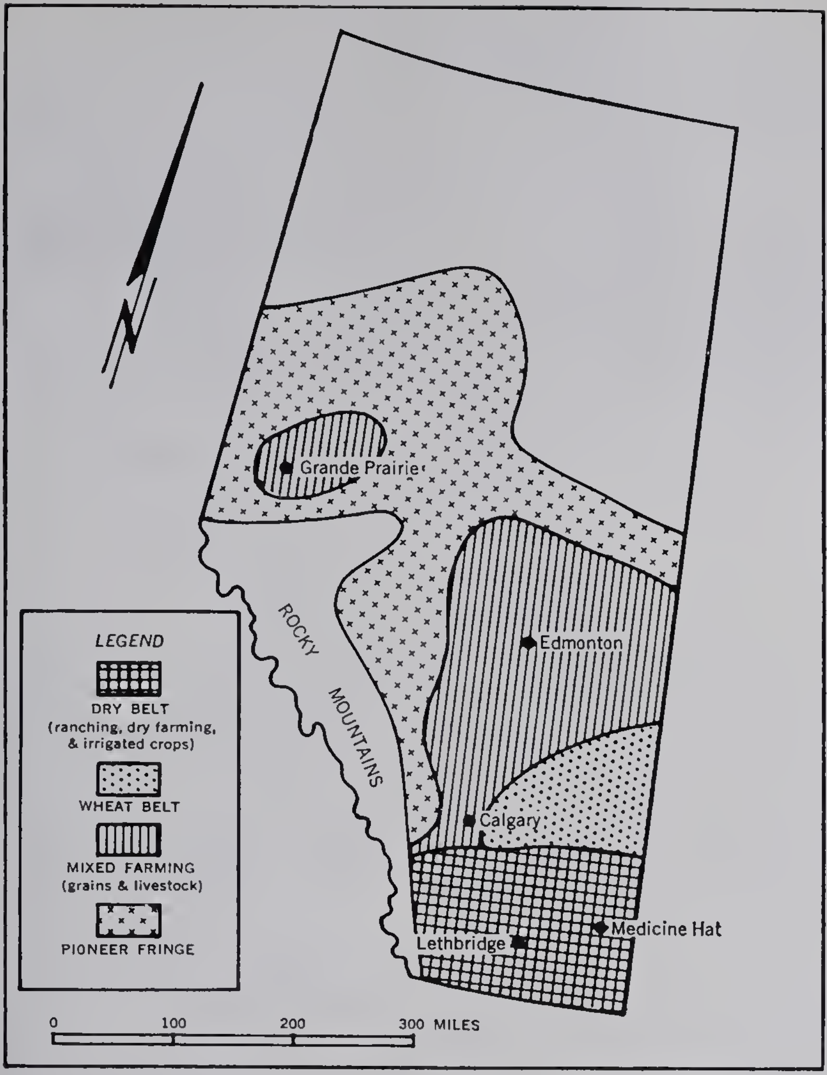
No other large Canadian cities have almost doubled their population in just ten years. This leads us to pose the following questions for discussion in this chapter:—

1. Why is Alberta's population increasing at a faster rate than that of any other province?
2. Which natural resources and occupations are attracting so many people?
3. What kinds of landscape give Alberta a wonderful variety of scenery and living conditions?

Our investigation will begin with a study of agriculture, which attracted large numbers of settlers.

The Calgary Stampede has made Alberta world famous as a home of cowboys and cattle, but this province also contains some of the finest prairie wheat farms, while the dry lands of Southern Alberta yield the greatest variety of irrigated farm crops in Canada.

Figure 8-1 shows that Alberta can be divided into a number of farming regions. These are similar to some of the regions that were noted in Chapters 6 and 7. Figure 6-10 shows those regions that extend throughout parts of all the three Prairie Provinces. Review Figures 6-8 and 6-9 and note how well farming regions of Alberta correspond with soil zones and vegetation regions. Refer to Figure 6-25 and find out



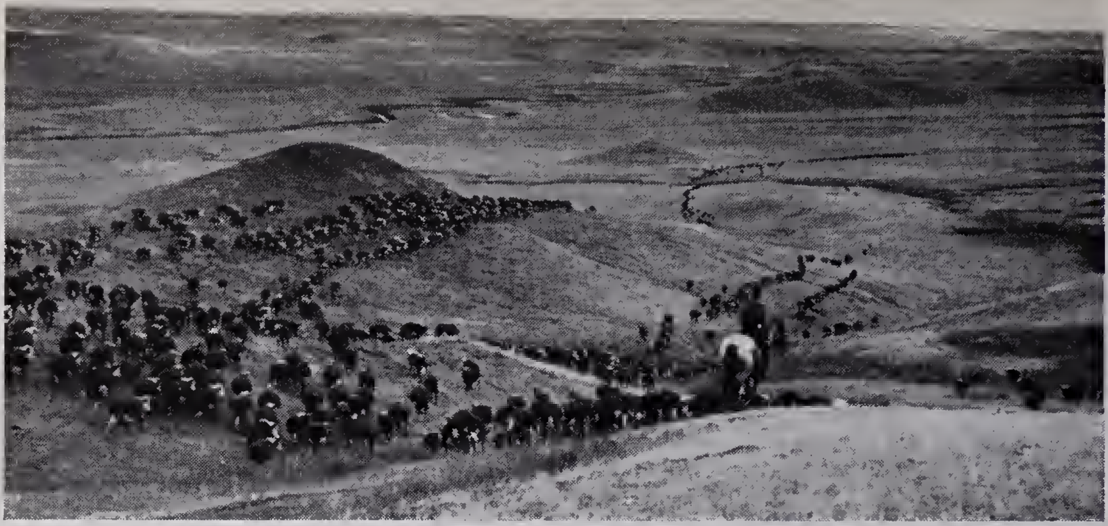
8—1 The agricultural regions of Alberta

which prairie level occupies most of the province. What name is given to this level? What is its elevation, according to the profile on page 278?

THE DRY BELT

Land use in the Dry Belt of Southern Alberta

1. Figure 8—2 is a scene that many Canadians associate with Alberta. It shows cattle in the Dry Belt being driven to summer pasture.
(a) What evidence is there that this is a dry region?
(b) Study the relief of the land very carefully. In what way is the river valley similar to that of the Qu'Appelle in Saskatchewan? (See Figure 7—7.)
(c) How was this valley probably formed?
(d) Why is it difficult to irrigate the land on the horizon in the far distance?
(e) Suggest reasons for believing that the cattle in this picture are beef cattle.
2. Figure 8—3 is a vertical aerial photograph, taken near Champion, Alberta, in the Dry Belt between Calgary and Lethbridge.
(a) About what percentage of the land is under cultivation in the photograph area?
(b) How is most of the cultivated land used? What proportion of it is in summer fallow?
(c) Why is there more land in summer fallow in this part of Alberta than in the Red River Basin of Southern Manitoba?



8—2 Cattle being driven to summer pasture in the Dry Belt of Alberta (National Film Board photo)

(d) Where are the main uncultivated areas in the photograph? Why are they uncultivated?

(e) Locate the village of Champion. Suggest the main functions of this village. Which village studied in Chapter 7 has similar functions?

3. Figure 8—4 is an oblique aerial view of Pincher Creek and its surrounding farmlands about 75 miles southwest of Champion.

(a) In what ways is land use similar to that around Champion? Locate some stream beds that, as at Champion, are deeply entrenched in the prairie.

(b) Which area — Pincher Creek or Champion — has more uncultivated land? Why?

(c) Pincher Creek is said to be in the "foothills" region of Alberta. Why is "foothills" a good term? Describe the general relief of the area.

(d) Suggest possible uses of the uncultivated land.

(e) In which general direction was the photographer facing when this picture was taken?

(f) How do you know that this photograph was taken in Alberta and not in Saskatchewan or Manitoba? How do you know that it could not have been taken in Ontario?

4. Figure 8—5 shows a field of potatoes under irrigation near Lethbridge.

(a) Describe the relief of this land.

(b) Note the main irrigation ditch in the foreground. What method is being used to convey the water from the ditch to the furrows in the potato field?

5. Figure 8—6 shows two other forms of land use in the Dry Belt near Taber, east of Lethbridge.

(a) Locate the field of sugar beets in the foreground of the picture.

(b) In the background may be seen a sugar factory. Find out if Alberta beet sugar is sold in your neighborhood.

(c) What other form of land use is evident in the foreground? What type of feed is available to these animals?

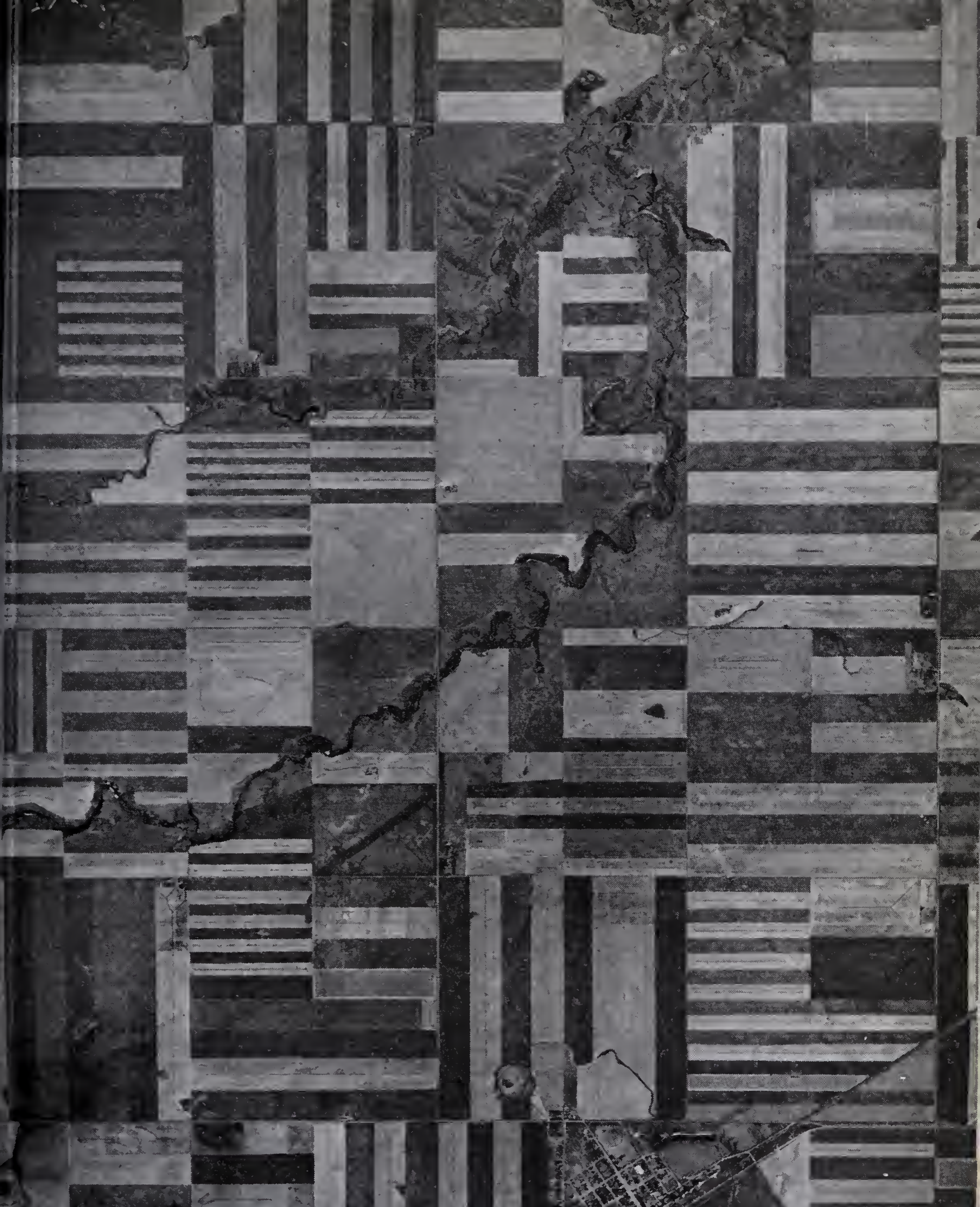
6. The St. Mary River Project is the largest irrigation project at present (1963) in Canada. More information about it will be gained from a further study of Figure 8—7.

(a) Estimate the area covered by this map.

(b) Comment on the location of the existing irrigation districts in relation to the railways.

(c) Where are the proposed districts located in relation to the existing ones?

(d) Which famous Canadian river is formed by the joining of the Bow and Oldman rivers? Which city is located on this river, at the eastern end of the St. Mary Project area?



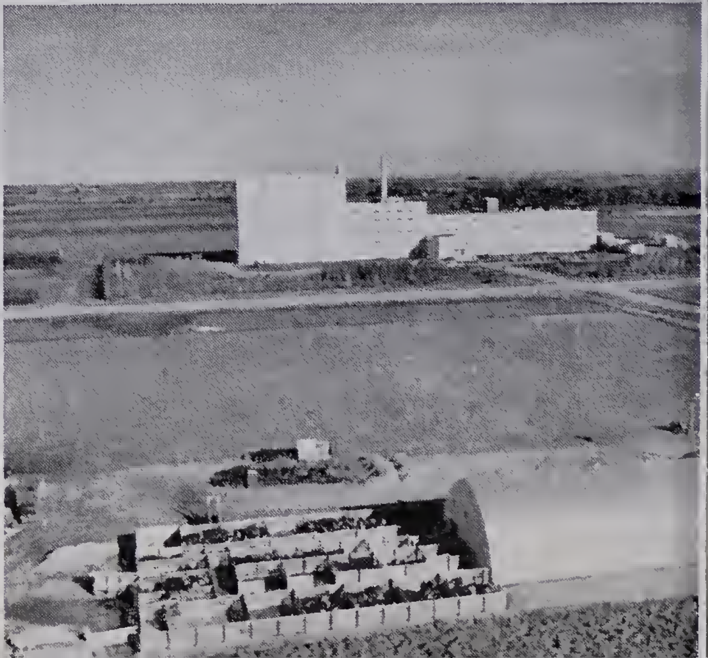
8—3 A vertical aerial photograph in the Dry Belt near Champion (R.C.A.F. photo)

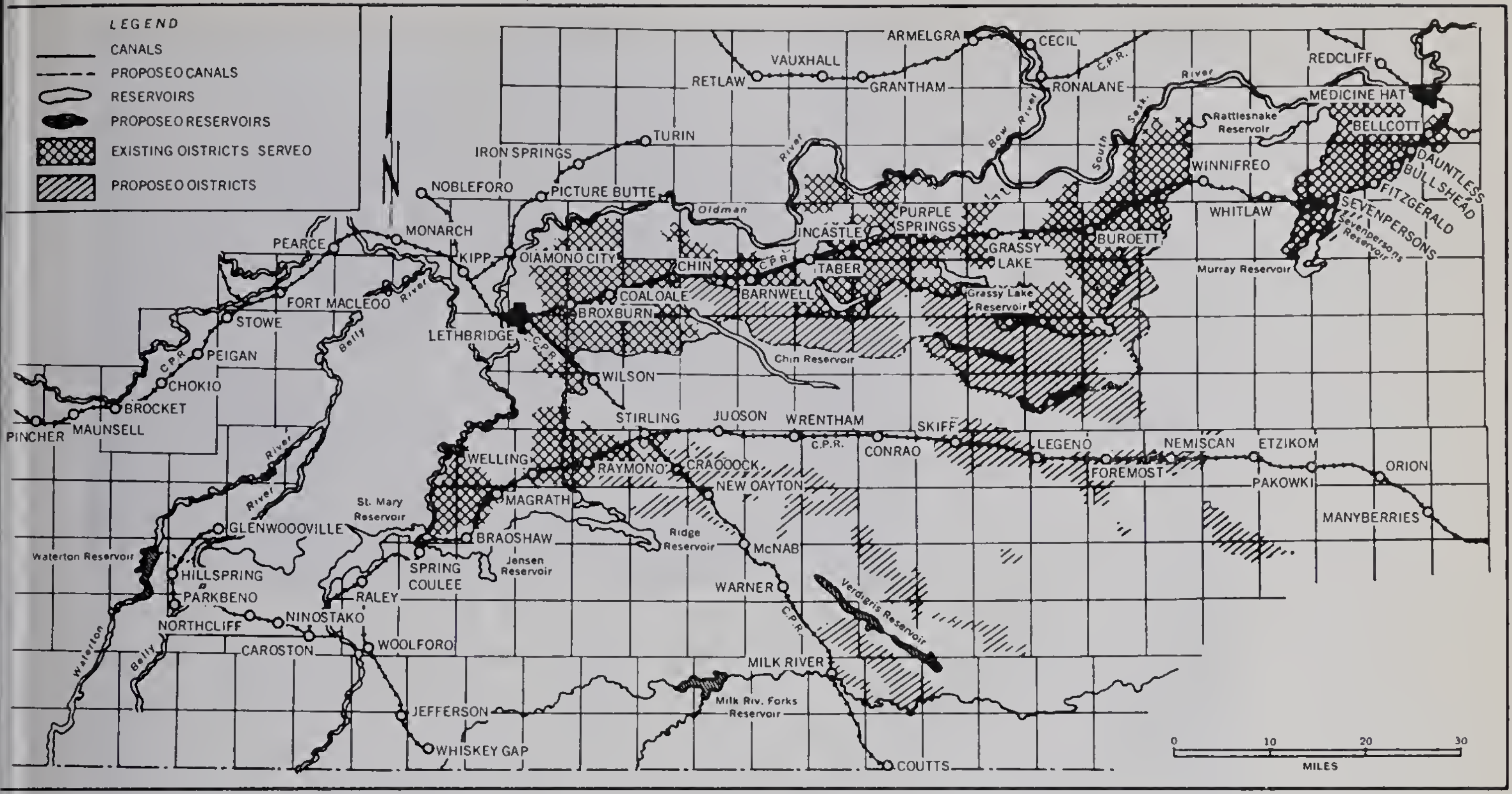
8—4 Pincher Creek, a foothills settlement west of the Dry Belt (National Film Board photo)

(e) Locate the famous St. Mary Dam and Reservoir, the heart of this project. Where does it lie in relation to Lethbridge?

8—5 Potatoes under irrigation in the Dry Belt (P.F.R.A. photo)

8—6 Stock pens and a sugar refinery near Taber (P.F.R.A. photo)





8—7 Map of the St. Mary River Project

North of the area shown in Figure 8-7 is the Bow River Irrigation Project. Together with the St. Mary River Project, there are nearly 700,000 acres of land under irrigation to the south and east of Calgary. In the near future, this total will reach 800,000 acres. These are the largest and most successful irrigated farmlands in Canada. An extensive system of dams, reservoirs, canals, and ditches enables farmers to overcome the dry climate, which is the greatest problem facing Southern Alberta. Conditions are similar to those around Swift Current, in Saskatchewan, as described on page 313. In Medicine Hat, about 13 inches of rain is received annually.

Here, as throughout the Alberta Dry Belt, the famous chinook winds help to moderate the winter climate. These warm, dry winds have lost their moisture since passing from the Pacific coast over the mountains and valleys of interior British Columbia. As they sweep down the eastern slopes of the Rocky Mountains, they cause sudden and marked increases in temperature. At Medicine Hat, the thermometer has been known to rocket from −20°F. to 50°F. within ten or twelve hours. The thin snow cover quickly melts in the sunny afternoons that often accompany a chinook wind. These conditions permit cattle to graze outdoors during the winters, although hay must be normally distributed to these animals.

Moving westward from Medicine Hat, precipitation increases, so that 16 inches is received at Lethbridge and 21 inches at Pincher Creek. These places are not always considered to be in the Dry Belt, although, as we have seen, summer fallowing is necessary and irrigation is required where vegetables and similar crops are grown.

Grazing is the main form of land use throughout the Dry Belt. Alberta has more beef cattle than any Canadian province, and nearly as many sheep as Quebec and Ontario combined. Although many of these are kept on large ranches, some of which exceed 10,000 acres in size, most are found in the other agricultural regions noted in Figure 8-1. The "finishing" of cattle and lambs – that is, the fattening of these animals in feed lots to improve quality and increase value – is an important industry of the Dry Belt. Lambs brought in from the range can be "finished" in about 100 days, during which time about 35 pounds will be added to the average animal. Cattle require 90 to 200 days for finishing, depending on the age of the animals. A yearling steer will increase in weight from about 700 to 1000 pounds during 150 days in a feed lot. To achieve such a gain, the animal must be fed 550 pounds of barley and 630 pounds of hay, in addition to other feed. Farmers near the towns shown in Figure 8-7 operate feed lots. Many are found in close association with irrigated vegetable crops, as shown in Figure 8-6. Sugar beet tops and beet pulp are nutritious foods for feeder cattle. Pea vines, cull peas, and cull potatoes* are also excellent foods. Alfalfa and clover are grown on many irrigated farms. Along with barley, oats, wheat, and rye, they contribute to the "finishing" already described. Many farmers, especially in the Bow River Irrigation District, raise hogs and poultry.

Peas, potatoes, and sugar beets have been noted as important irrigation crops. Melons, tomatoes, and various other vegetables, particularly canning varieties, make the Alberta Dry Belt a truck crop region of increasing importance. With the growth of population in the Prairie Provinces and British Columbia, and especially with the shortage of good agricultural land in the last-named province, these crops have an assured and growing market in the west.

Wheat is raised, as noted in Figures 8-3 and 8-4, by "dry farming" methods, involving summer fallowing and strip cropping. Farms of 1000 acres – among the largest grain farms in Canada – are common. Wheat is also grown under irrigation. Yields as high as 65 bushels to the acre have been obtained by this method, as compared with a maximum of 15 bushels to the acre by dry farming methods. However, the main wheat belt of Alberta lies north of the Dry Belt, as shown in Figure 8-1.

The main irrigation projects mentioned – those of the St. Mary

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*Culls refer to vegetables "culled out" as unsuitable for human consumption.

8—8 This farm family is preparing to move, house and all, from a drought area to an irrigated homestead. (P.F.R.A. photo)

and Bow rivers — have been developed by the Prairie Farm Rehabilitation Administration, the work of which was described on pages 314-318. The Federal Government, the Province of Alberta, and the farmers themselves have shared the costs. Many farmers from drought areas have been resettled on irrigated lands. Figure 8-8 shows a farm family preparing to move their house and furnishings to an irrigated homestead at Hays, in the Bow River Project.

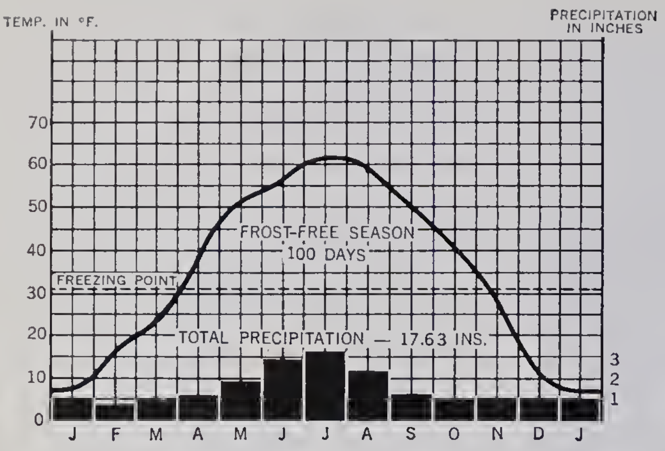
Irrigation has helped to develop a form of mixed farming economy in the Dry Belt. No longer are farmers entirely dependent on wheat and cattle. Processing industries, such as the sugar beet factory at Taber, shown in Figure 8-6, and the potato-processing plant opened in 1962 near Lethbridge, have made more jobs available. Prosperity is evident in the attractive and fast-growing towns. Places such as Medicine Hat and Lethbridge are among the most pleasant cities in the Prairie Provinces.

THE WHEAT BELT

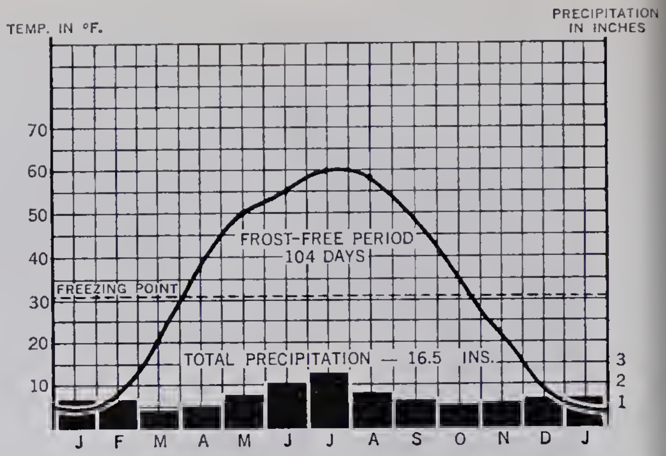
As Figure 6-10 shows, the Prairie Wheat Belt extends into Alberta almost as far west as Calgary. In this region, wheat is grown in much the same way as that described for the Regina Plains in Chapter 7. Suggest why a large proportion of Alberta's grain is exported via Prince Rupert and Vancouver. Such grain includes some destined for the United Kingdom and Western Europe. What route would a grain shipment from Edmonton to Liverpool take if it were sent via Vancouver? Trace this route on a globe. What other markets are best reached by this route?

THE MIXED FARMING BELT

Edmonton is the centre of the province's Mixed Farming Belt. This level or rolling region supports some of the finest farms in the Prairie



8—9 Climatic graph of Edmonton



8—10 Climatic graph of Grande Prairie

Provinces. Much of it is in the black soils zone (see Figure 6-9) which corresponds fairly closely to the park belt of vegetation described in Chapter 7. Wheat is still a major crop, but a wide variety of coarse grains is also grown. These, and various grasses, are used to feed the great numbers of beef cattle found in the Mixed Farming Belt. Indeed, the majority of Alberta's beef cattle, hogs, poultry, and dairy cattle are found in this rich region. Only in Southern Ontario is hog raising more important. Moreover, the region contains more than one fourth of Canada's swine population. Dairy herds meet the needs of the large urban markets of Calgary and Edmonton. Farms in this belt are generally smaller than those of the Wheat Belt, with few exceeding 320 acres.

The climate of Alberta

1. Review the material on climate given on page 333. What are the chief features of the Dry Belt climate?

2. Figure 8—9 is a climatic graph of Edmonton, and helps to explain farming practices in the Mixed Farming Region just described.

(a) What is the total annual precipitation at Edmonton? Compare it with that of Medicine Hat (page 333), Regina (page 299), Saskatoon (page 309), and Winnipeg (Figure 6—2).

(b) How much of Edmonton's precipitation occurs during the height of the growing season, in June, July, and August?

(c) From your answer to (a) above, what conclusion do you draw about the trend of precipitation across the prairies, from Winnipeg west to Edmonton?

(d) Why does Edmonton receive more precipitation than the central prairies?

(e) The rate of evaporation of moisture at Edmonton is lower than that at Regina or Winnipeg. How do summer temperature conditions at these three places help to explain this fact? Why is this fact of significance to farming?

3. Figure 8—1 indicates that the Mixed Farming Belt extends to the Peace River District, northwest of Edmonton. A study of the climatic graph of Grande Prairie (Figure 8—10) will help to explain why a prosperous farming region can exist so far north.

(a) What is the latitude of Grande Prairie? Why does this northerly location have the effect of lengthening the growing period?

(b) What is the January average temperature at Grande Prairie? Winters here are colder than those at Edmonton or Calgary, but slightly warmer than those at Regina or Winnipeg. Why are all these Alberta centres somewhat warmer in winter than many other places in the Prairie Provinces?

(c) What is the July average temperature at Grande Prairie?

(d) What is the total annual precipitation there?

(e) From this study of climatic conditions, and by reference to Figure 6—9 in Chapter 6, state possible reasons why farming is more successful there than in any other area so far north in Canada.

The climate of the Prairies

Figure 8—11 a, b, c, and d will be helpful in summing up the climate of the Prairie Provinces.

(a) What is the coldest January isotherm for the three provinces? In which general area do the coldest winters occur?

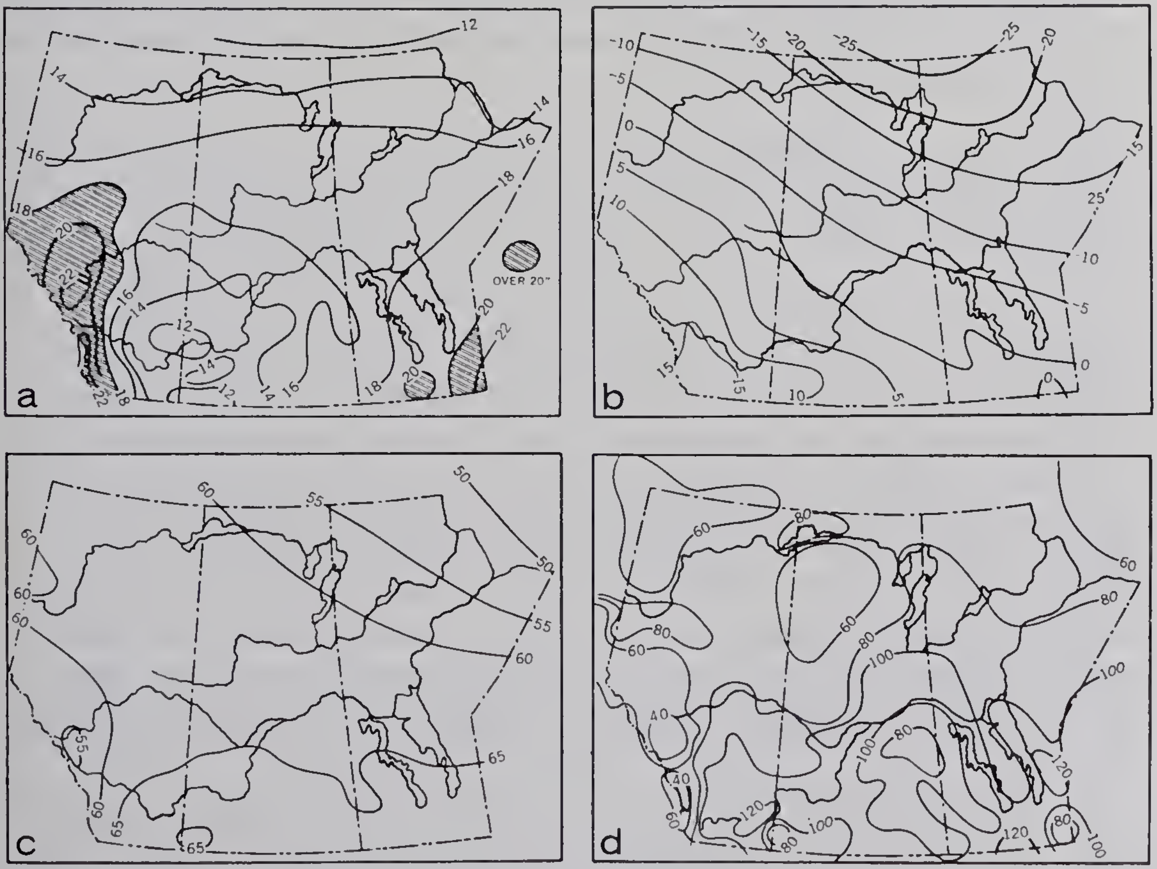
(b) What is the warmest January isotherm? Compare this with the January average in your neighborhood.

(c) Where do the warmest winters occur on the prairies?

(d) Where do the coolest summers in the Prairie Provinces occur? What is the July average temperature in this area?

(e) Where do the warmest summers occur?

(f) Account for the existence of a cool summer isotherm (55°F.) in western Alberta in July.



8—11 (a) Mean annual precipitation in the Prairie Provinces (b) Average January temperatures (c) Average July temperatures (d) Length of frost-free season

(g) Describe the general trend of precipitation in the Prairie Provinces from north to south; from east to west. Compare maximum and minimum figures with those in your neighborhood.

(h) What is the range of the frost-free season in the southern part of the prairies? Compare these figures with the length of the frost-free season in your neighborhood. Account for the very short frost-free season of only 40 days in southwestern Alberta.

(i) Sum up the main features of the climate of the Prairie Provinces as revealed by these maps.

THE PEACE RIVER DISTRICT

This region was first visited by Alexander Mackenzie in 1793, when he sailed up the river, during his overland voyage to the Pacific. His description of the country, as it appeared then, follows:*

> From a place which we quitted this morning, the west side of the river displayed some of the most beautiful scenery I had ever beheld. The ground rises at intervals to a considerable height and stretches inward to a considerable distance: at every interval or pause in the rise there is a gently ascending space . . . which is alternate with abrupt precipices to the summit of the whole, or at least as far as the eye could distinguish. This magnificent theatre of nature has all the decorations which the trees and animals can afford it; groves of poplar in every shape vary the scene and their intervals are enlivened with vast herds of elk and buffalo; the former choosing the steeps and uplands, the latter preferring the plains. At this time, the buffaloes were attended by their young ones who were frisking about them: it appeared that the elks would soon exhibit the same enlivening circumstance. The whole country displayed an exuberant verdure; the trees that wear blossoms were advancing fast at that delightful appearance.

What does this account tell you about the relief of the Peace River District? What does it tell you about the vegetation and wild life at this time? This area is in the "park belt" of grassland and scattered trees. Quote a sentence that describes this belt as it appeared to Mackenzie. In what ways has the Peace River District changed in appearance since he saw it? In which season did he pass through it?

For a century after Mackenzie's visit, the area was visited only by occasional trappers. Trading posts were set up, especially on the British Columbia side. Many goldseekers passed through the area in 1898 on their way to the Klondike. Some remained and settled in the district. The first large wave of settlers arrived during the 1909-15 period, before there were either roads or railways. At that time, it took a month or longer to reach the area from Edmonton.** Today,

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*From Alexander Mackenzie's account of his voyages published in 1801 and reprinted in Volume III of *Master Works of Canadian Authors,* edited by John W. Garvin, Toronto, 1927.

**An interesting account of early settlement in the Peace River District may be found in Bezanson's *Sodbusters Invade the Peace,* Ryerson Press, Toronto.

the Peace River District has many connections with the outside world. These are shown in Figure 8-30 and in Figure 9-61 of Chapter 9. The road and railway from Edmonton serve the district. Of great significance in recent years has been the extension of road and rail services from southern and central British Columbia to that province's Peace River District. The Alberta side has also benefited. In addition to road and rail connections, pipelines also now link British Columbia to the Alberta Peace River country. In some ways, all these routes are helping to make the area part of the hinterland of Vancouver, although Edmonton remains its real metropolis. The road and rail routes referred to should be traced in Figure 9-61. Figures 8-24 and 8-25 show pipelines. This is an example of how transportation routes can affect the relationship between cities and their hinterlands.

Grain, especially wheat, and livestock are the major farming enterprises of the district. Good soils, adequate rainfall, and long summer days that help to overcome a short growing season have been important factors in regional development. Figure 9-52, on page 428, shows a grain field in the British Columbia part of the Peace River District. Much of the Alberta part looks the same.

THE PIONEER FRINGE

Outside the black soils belt of well-developed mixed farming is the main area of pioneer fringe in Alberta, as shown in Figure 8-1. This is country similar to that discussed on page 319 in Chapter 7. Much of it looks like the countryside shown in Figure 7-18. Here is a description of a pioneer fringe area northeast of Grande Prairie, as given in an information booklet for settlers, published by the Department of Lands and Forests of Alberta:

> There are approximately 325,000 acres of public land open for settlement in this area. Most of the land lies adjacent to the Peace River. . . . For a distance of about four to six miles from the banks of the Peace River the soils are brownish colored silt loams and silty clay loams that have very few to no stones. Sandy patches occur in some portions of these areas. . . . Gravelly or stony ridges are of common occurrence in many parts of these outlying areas.
>
> In most of the area the topography is quite variable and lacks the uniformity characteristic of much of the remainder of the Peace River District. Deep, wide coulees are common and low, ill-drained areas are of frequent occurrence. Much of the public land in this area has a medium-to-heavy tree cover. This is particularly true of those portions of the area that are farther removed from settlement. Many of the low, ill-drained areas have an accumulation of moss peat and variable stands of black spruce. There are only about 100,000 acres of arable land . . . open for settlement.

What fraction of the area consists of suitable farmland? State reasons why so much of it is unsuitable. The Mackenzie Highway (see Figure

10-28), connecting the Peace River District to Hay River has opened vast new areas to pioneer settlement. In the Peace River and Hay River districts combined, nearly 6,000,000 acres of good farmland are believed to be available. This is equal to nearly five times the total area of Prince Edward Island. Nowhere in Canada is more new land being brought "under the plough." Several hundred new farms are being established each year.

The Pioneer Fringe of Alberta extends quite far south, lying directly west of the main populated part of the province that extends from Edmonton to Calgary. Only a small proportion of the land here is devoted to crops. Some land can be used for grazing or seeded permanent pasture. Figure 8-23 shows how densely wooded are some parts of this pioneer fringe area. Lands such as these are available to homesteaders for lease or sale. Government loans are available to assist settlers in clearing and breaking such land.

The above account and photographs such as Figure 8-23 make plain that Alberta is far from being the treeless prairie that many people imagine. In fact, two thirds of the province is classified as forest — in some cases so densely forested that settlement is difficult or impossible. This immense forest is nearly twice the size of Nova Scotia, New Brunswick, and the island of Newfoundland combined. Where is most of the forested land of Alberta? Because most of it exists away from the agricultural lands through which most transportation routes pass, visitors to the province are often not aware of this great natural resource.

Various species of pine, balsam fir, and tamarack are the basis of most of Alberta's forest industries. In 1962, there were more than 1200 woods-products firms in the province. Sawmilling accounts for the greatest volume of timber at present. Construction lumber, boxes and crates, railway ties, and plywood are among the products processed from the sawmill output. The manufacture of wood pulp is a growing industry. There is no doubt that Alberta's forest industries, still in their infancy, will play a significant part in the future of the province.

MOUNTAIN SCENERY: AN IMPORTANT ALBERTA RESOURCE

About 21,000 square miles of Alberta's forested area is located in national parks. The two most important and famous of these are Banff and Jasper National parks. Together, they cover an area nearly four times the size of Prince Edward Island. The mountains, valleys, lakes, forests, and the plant and animal life attract thousands of visitors each year. Tourism is thus an industry of major importance, earning millions of dollars annually. Banff, in its magnificent Rocky Mountain setting, is Canada's most famous resort town, known to travellers and nature lovers throughout the world.

The site and functions of Banff as a resort town

1. Figure 8—12 was taken fairly late in the afternoon.
(a) In which general direction was the photographer facing?
(b) The photograph was taken during the height of the summer season. What evidence is there of this fact?
(c) Describe the site of Banff.
(d) Comment on the vegetation cover in this area. What type of tree predominates?
(e) Why are there no trees on the summits of the highest mountains?
(f) The great peak in the centre of the photograph is Mount Rundle, nearly 9000 feet high. Describe the valley to the right of Mount Rundle.*
2. The following features have been indicated by letters on the photograph of Banff: Tunnel Mountain; Mount Rundle; Bow River; Banff Springs Hotel; a tributary of the Bow River. Use the map to identify these features. To align the map with the photograph, it may be necessary to use two copies of this book. Turn the page containing the map upside down and you will find it easy to compare it with the photograph.
3. Study Figure 8—13.**
(a) Trace the course of the Bow River across the centre of the map. Where else have we studied this river?
(b) Describe the site of Banff, according to the map. What is the approximate elevation of the site?
(c) Which transcontinental railway line serves Banff?
(d) The Trans-Canada Highway may be seen parallel to the railway. Describe its course in relation to the Bow River and suggest reasons for its position.
(e) List the main features of the Bow River revealed by the map. What is the average width of the valley at Banff?
(f) Make a list of the main recreation and resort facilities at Banff. What sports and other activities are available to tourists?
4. The Mount Norquay Chair Lift is a famous attraction at Banff.
(a) Locate the road that leads to the chair lift. Estimate the length of this road. Why is it so winding?
(b) What is the elevation of this road where it meets the main highway? What is its elevation near the ski lodge, at the bottom end of the chair lift?
(c) What is the contour interval of the map?
(d) What is the elevation of the top end of the chair lift? What is the total vertical distance travelled in a trip up the lift? What is the actual length of a journey up it?
(e) The view from the top of the chair lift is one of the finest in the Canadian Rockies. In which direction does Banff appear from this point? Describe what you would expect to see, looking across the Bow Valley from there.

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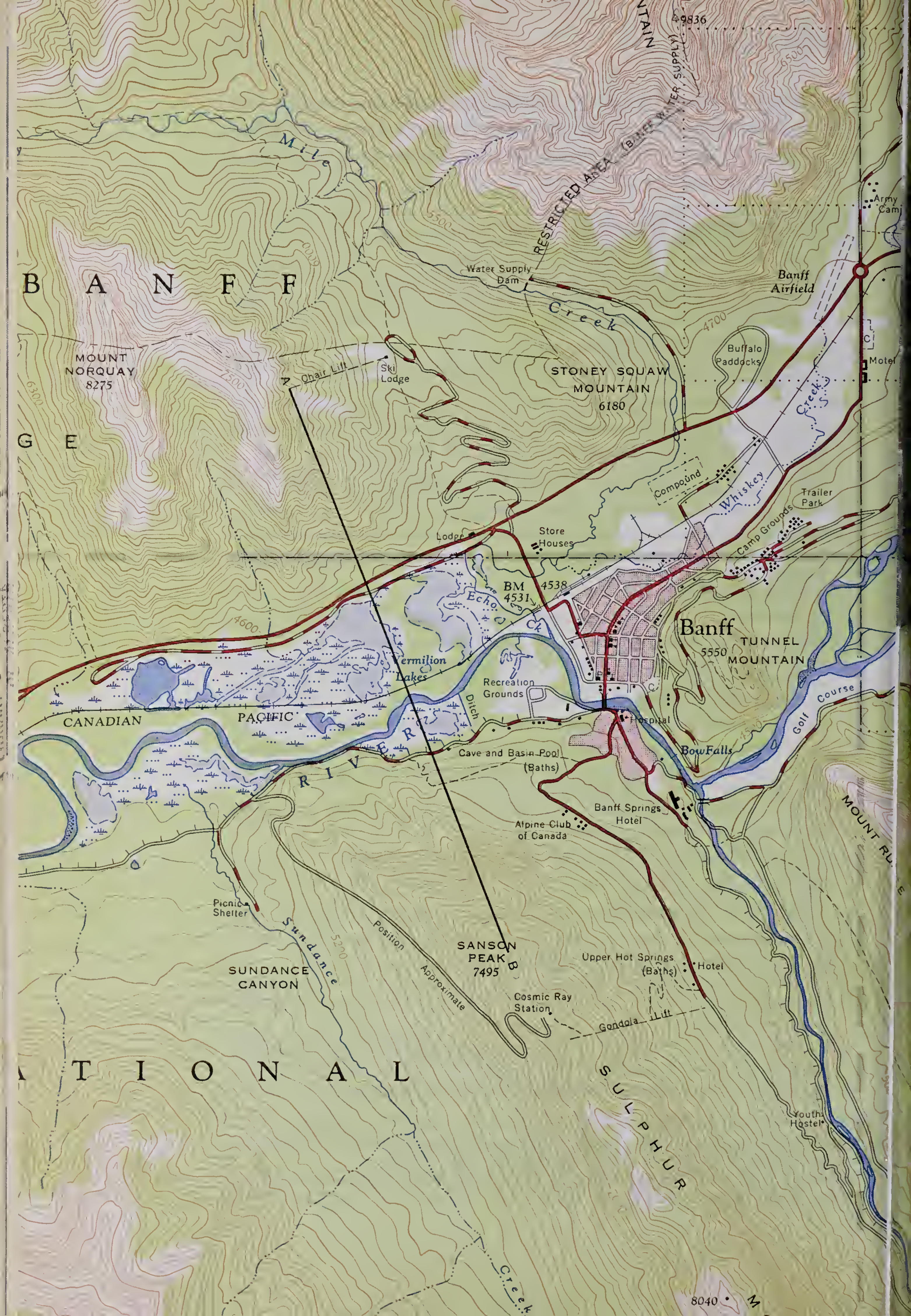
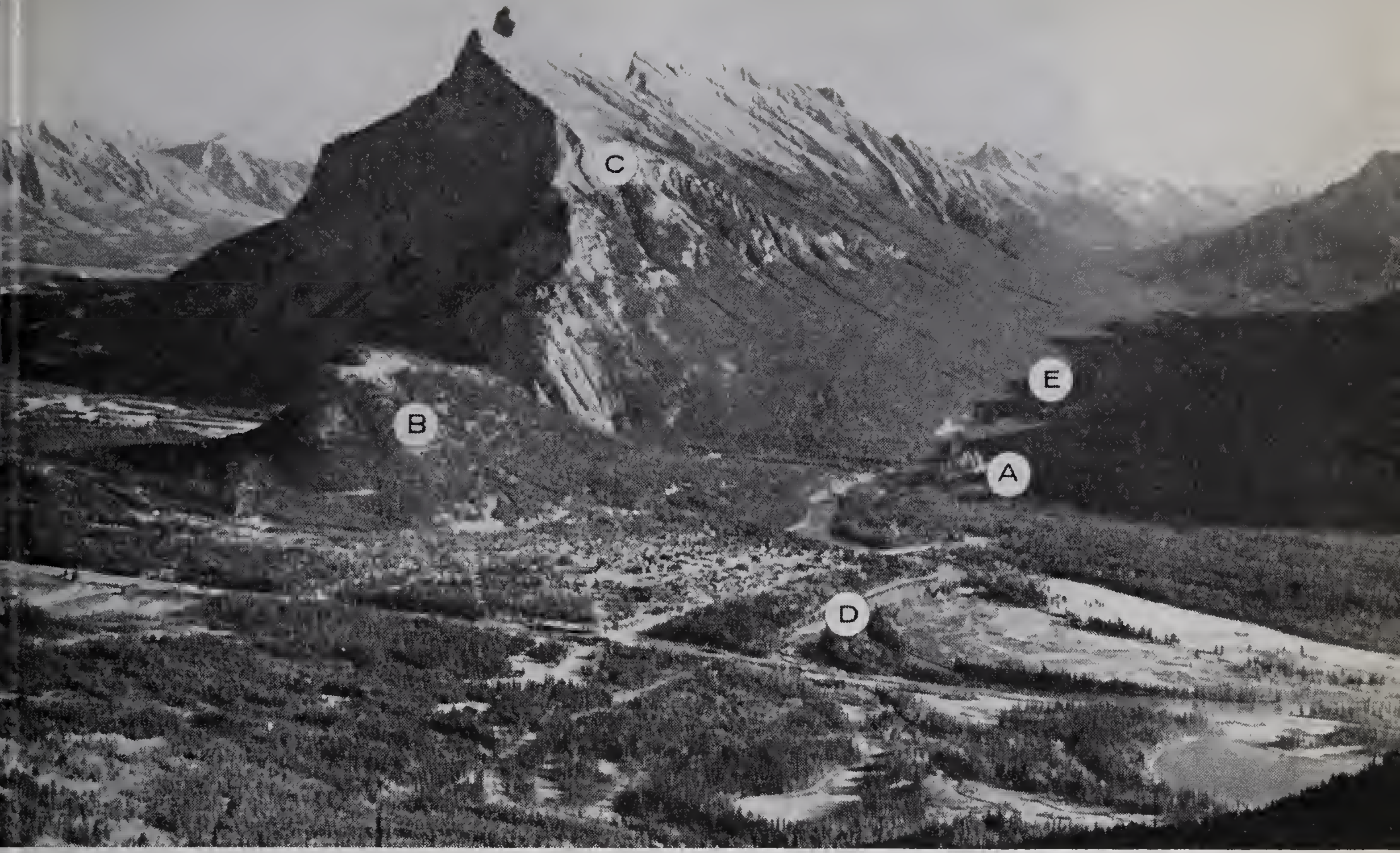
*This is a fairly typical glaciated valley in the Canadian Rockies. Such valleys are usually broad and fairly flat-floored. They are often said to be U-shaped. Why is it unlikely that the stream alone could be responsible for carving this valley?

**The topographic map of Banff is part of Sheet 82O/4 (East Half) in the National Topographic Series.


B A N F F
G E
ATIONAL
MOUNT NORQUAY
8275
9836
RESTRICTED AREA (BANFF WATER SUPPLY)
Mile
Creek
Water Supply Dam
Chair Lift
Ski Lodge
A
B
STONEY SQUAW MOUNTAIN
6180
Banff Airfield
Army Camp
Motel
C
Buffalo Paddocks
Whiskey Creek
Compound
Trailer Park
Camp Grounds
Lodge
Store Houses
BM 4531
4538
Echo Ck
Vermilion Lakes
Banff
TUNNEL MOUNTAIN
5550
CANADIAN PACIFIC
RIVER
Recreation Grounds
Ditch
Hospital
Bow Falls
Golf Course
Cave and Basin Pool (Baths)
Banff Springs Hotel
Alpine Club of Canada
MOUNT RUNDLE
Picnic Shelter
Sundance Creek
SUNDANCE CANYON
Position Approximate
SANSON PEAK
7495
Upper Hot Springs (Baths)
Hotel
Cosmic Ray Station
Gondola Lift
SULPHUR
Youth Hostel
8040
6300
7300
6000
5500
4700
4600
4500
5200



8—12 A view of Banff and surrounding area (Alberta Government photo)

8—13 (opposite) A topographic map of Banff on the 1:50,000 scale (Sheet 82 O/4 East half, in National Topographic Series)

(f) AB is a line of section from the top of Mount Norquay Chair Lift (which is taken to be 7000 feet in elevation for this purpose), to Sanson Peak on the opposite side of the Bow Valley. What is the length of line AB? Compare the elevation of Sanson Peak with that of Mount Norquay. Using the example described at the bottom of page 145 in Chapter 4, draw a profile of the Bow Valley along AB. Use the horizontal scale provided (1:50,000). Use a vertical scale of ¼ inch to 500 feet, and indicate the contours at intervals of 500 feet.

(g) Describe the shape of the Bow Valley as revealed by your profile.

5. Figure 8—14 shows the Canadian Pacific transcontinental train in the Bow Valley, west of Banff. In the distance is Mount Eisenhower, which is nearly 10,000 feet high.

(a) Describe the nature of the forest on the valley floor.

(b) Locate the treeline. Why do trees not grow above this line?

(c) What does the absence of snow on Mount Eisenhower suggest about the season?

(d) How has the train been specially equipped to meet the needs of tourists?

6. Figure 8—15 is a scene in Jasper National Park, showing the Athabaska Glacier, a part of the famous Columbia Icefield. This is one of the greatest attractions in the Canadian Rockies. Many interesting glacial features may be studied in this photograph. The following statements describe some of them. In each case, identify the feature described by matching it with a letter on the photograph:

8—14 A transcontinental train in the Bow Valley near Mount Eisenhower (Canadian Pacific Railway photo)

(a) a **glacier** has been described as a "river of ice." How does this description fit the Athabaska Glacier, largest in the Canadian Rockies, as shown here?

(b) a **hanging valley** hangs above the main valley and is occupied by tributary glaciers. Because they are smaller, these tributary glaciers erode more slowly than the main glacier.

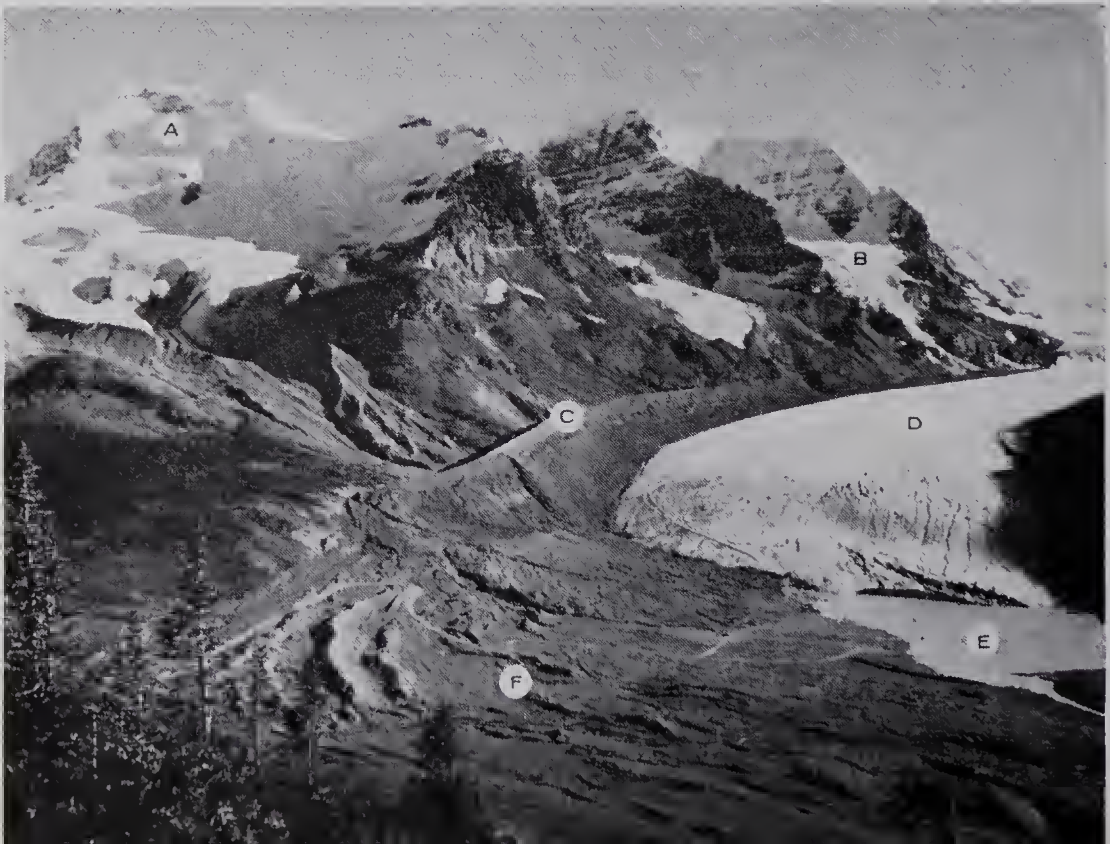
(c) a **cirque** is a rock hollow, often filled with ice and snow, located high up in glaciated mountain country.

(d) a **moraine-ponded lake** is a lake formed where drainage has been dammed by a moraine which is material (sand, stones, etc.) deposited by a glacier as it melts. Describe the sources of water feeding the lake shown in this photograph.

(e) a **lateral moraine** is material deposited along the sides of a glacier.

(f) a **terminal moraine** is material deposited at the end of a glacier.

8—15 The Athabaska Glacier in the Columbia Icefields (Canadian Pacific Railway photo)



7. (a) Over a period of time, glaciers advance or retreat, according to temperature and amount of snowfall. The Athabaska Glacier, like most glaciers in the Canadian Rockies, has retreated somewhat since 1930. What evidence of this fact is there in Figure 8—15?
(b) What does this suggest about climatic conditions in the Canadian Rockies in recent years?
(c) What kind of trees may be seen to the lower left in the photograph? Why is the area generally treeless?

Jasper National Park is even larger than Banff. Served by the Canadian National Railways, it attracts thousands of visitors each summer. During the 1959-60 tourist year, these two parks were visited by more than 1,000,000 people. These comprised nearly one third of all visitors to Canada's 18 scenic national parks. The total area of national parks is nearly 30,000 square miles, which is larger than the province of New Brunswick. Name a national park in your province. What features justified setting it aside as a park? There are 20 national historic parks, commemorating great events in Canada's past. Every province maintains provincial parks. In 1961, there were nearly 400 of these in Canada.

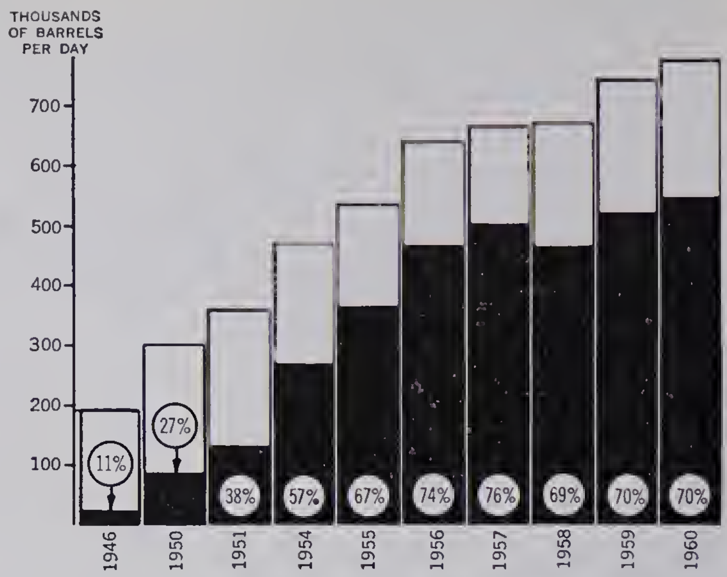
Although Canada's parks have been established mainly for the recreation and enjoyment of her own people, their importance to the tourist trade is vital. In 1959, nearly 30,000,000 tourists entered Canada, the vast majority coming from the United States. These tourists spent a total of 420,000,000 dollars. Travel by Canadians within their own country is an even more important aspect of the tourist industry. Banff, with nearly 1,000,000 visitors, was the most popular national park in Canada in 1959. The money spent by these visitors in the motels, hotels, restaurants, and stores of Banff and other Alberta centres makes tourism a major provincial industry.

OIL: ALBERTA'S GREATEST "CROP"

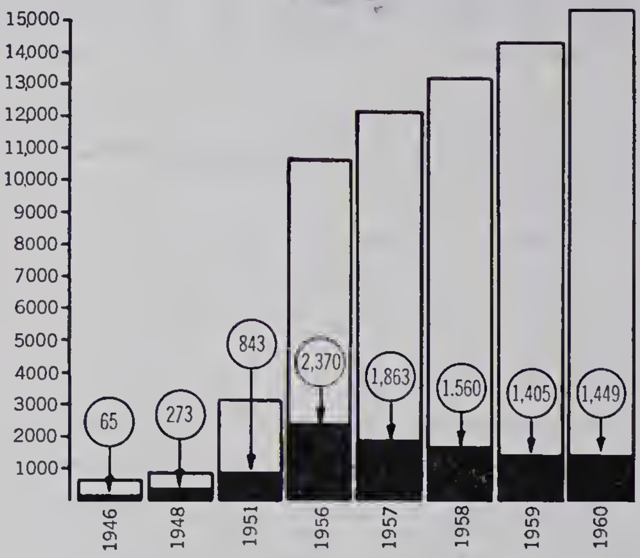
In 1960, the consumption of oil in Canada averaged 17.7 barrels (more than 600 gallons) per person. Half of Canada's homes are heated by oil, and many burn natural gas which is usually produced in association with oil. There is now one automobile for every four Canadians and an average of one tractor for every occupied farm. Suggest other uses of oil in modern life. Oil and its products have become vital to the lives of most Canadians.

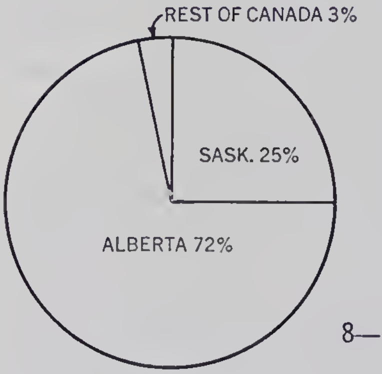
Figures 8-16, 8-17, and 8-18 present data on oil needs and production in Canada during the period 1946 to 1960. How many times did Canada's oil needs multiply during this period? What percent of her needs did she meet in 1946? in 1960? In 1946, Canada imported 200,000 barrels of crude oil and petroleum products. In 1960, 444,000

8—16 Canada's oil needs: black portion represents percentage supplied by Canadian production in the years 1946-1960.



8—17 Oil wells capable of producing (1946-60): black portion represents number of wells drilled each year.



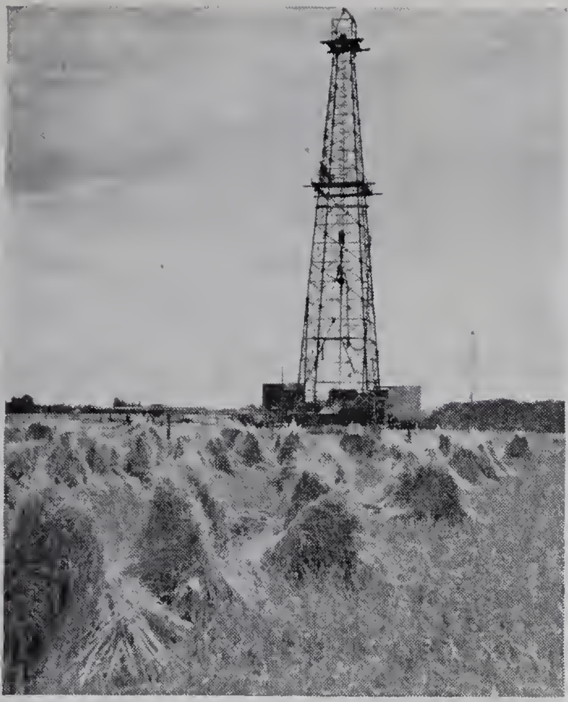


8—18 Sources of Canadian oil production in 1960

barrels were imported. Thus, due to increased requirements, we actually import twice as much oil as we did in 1946.

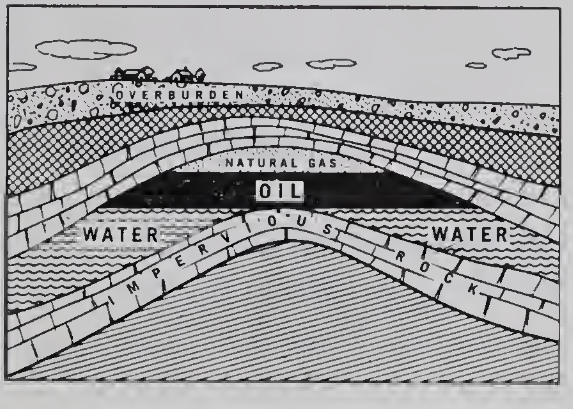
Figure 8-17 indicates the high level of activity in the oil industry since 1946. How many wells were drilled in that year? Compare this number with that for 1956. How many wells were drilled in 1960? Compare the figures, for 1946 and 1960, of wells already producing, or capable of producing.

In spite of this increase in production, reserves of petroleum continue to grow as new oil fields are discovered. Thus, in 1946, Canada's known reserves of crude oil amounted to only 72,000,000 barrels. By 1960, they had multiplied more than 50 times to a total of four *billion* barrels.



8—19 (left) This land produces two of Alberta's greatest sources of wealth (Alberta Government photo)

8—20 Diagram of a typical oil formation



According to Figure 8-18, what percent of Canada's output did Alberta produce in 1960? What was the only other province of significance? As early as 1900, the streets of Medicine Hat were being lighted with natural gas, which was so cheap and plentiful that the lights burned day and night because it would not have paid the city to have someone put them out. Oil has been produced from the Turner Valley near Calgary for at least half a century, but the great oil boom began only after 1945. On February 13, 1947, Imperial Leduc Number 1 "blew in," 16 miles south of Edmonton, and sparked the greatest oil boom in Canadian history. In 1948, the Redwater field, north of Edmonton, began production and is now the largest producing oil field in Canada. Edmonton has become one of the oil capitals of the world. Figure 8-19 indicates the dramatic change that oil has made in the province's landscape.

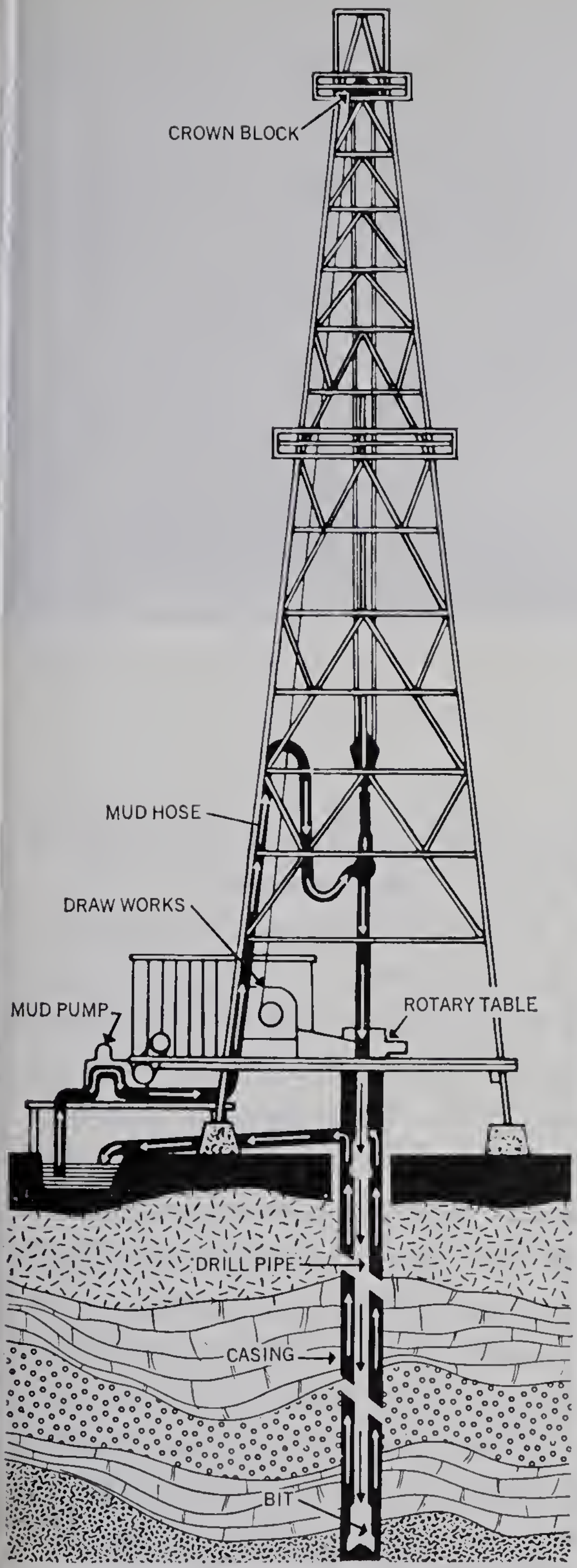
Oil is found in sedimentary rocks. Underneath the rolling surface of the Prairie Provinces are many dome-shaped rock formations of the type shown in Figure 8-20. When sediments were deposited by the ancient seas that once covered this part of the world, billions of tiny sea creatures were crushed under the great pressure of the accumulating material. These pressures also caused heat which, after millions of years, turned the sea creatures into petroleum, a word that means "rock oil."

As Figure 8-20 shows, the petroleum seeped into reservoirs of porous rock, which held it much as a sponge holds water. Some oil worked its way to the surface and escaped, but most was held in place by caps of non-porous or *impervious* rock.

Oil prospectors know that it is not profitable to search for oil in mountainous areas, or in igneous rocks, such as the Canadian Shield. In foothill areas like western Alberta, near mountains where mountain building may have folded the sedimentary strata gently, oil is often found. However, before Leduc No. 1 "blew in" in 1947, companies had spent nearly 20 years and many millions of dollars searching for the great oil field that they were quite sure surrounded Edmonton. The company that made this discovery had already drilled 133 "wildcat" wells before striking a single good producer.

The search for oil requires much skill, patience, and equipment. Geologists study the rocks and aerial photographs to learn more about the structure of the earth. They spend months in the wilderness, travelling by canoe or pack train, looking for clues. *Core drilling* is an important method used. A special portable drill cuts cores out of the rocks and brings them to the surface. These rock samples are studied carefully and catalogued and preserved. *Seismology* is helpful in the search for oil. By this method, man-made earthquakes are set off by exploding dynamite in a hole. The shock waves "bounce" from the layers of rock below, back to the surface, where they are measured on a *seismograph*. The time they take to bounce back can be measured in thousandths of a second. This enables the geologists to estimate the depths of the rocks below and to learn the shapes of underground formations.

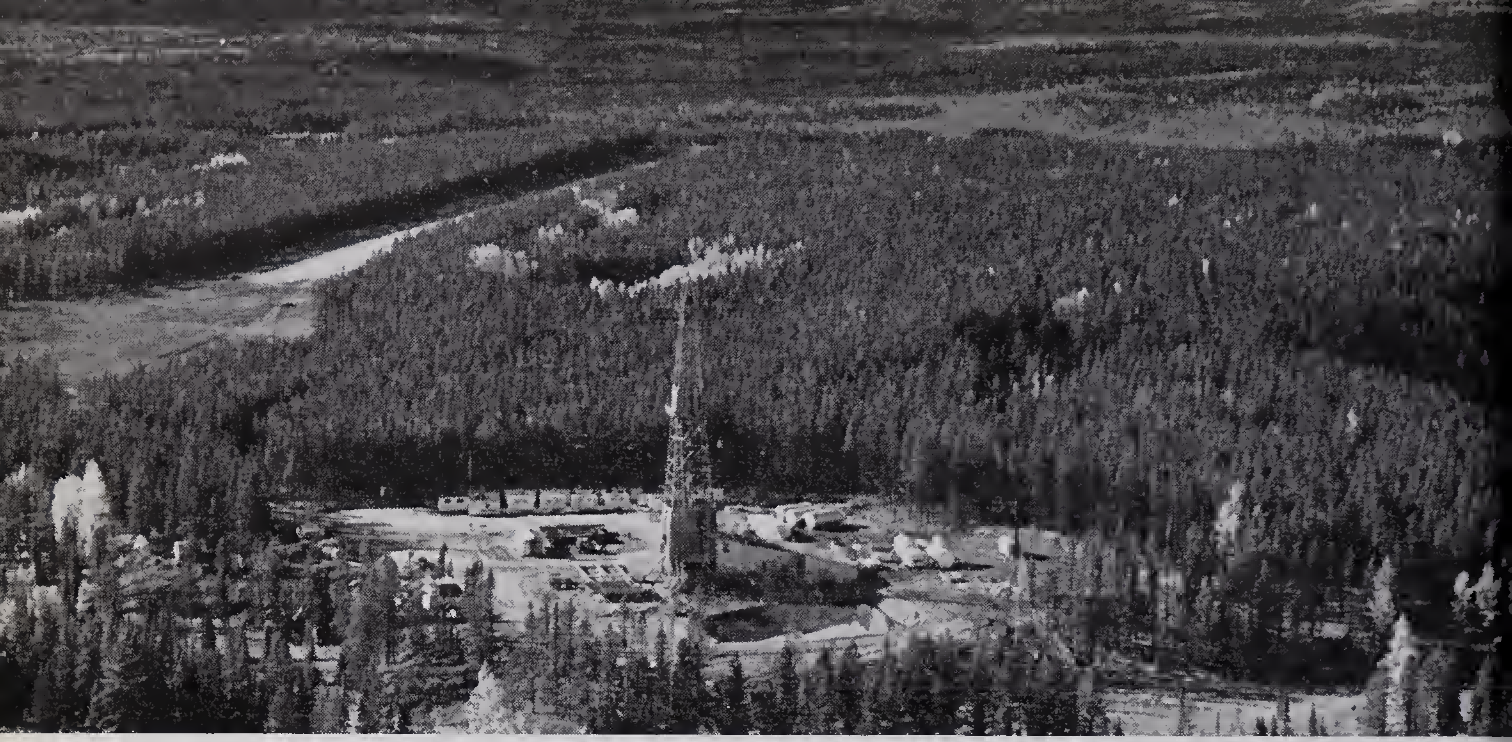
Drilling is the real test of success in the search for oil. Exploration in untested territory is called "wildcat" drilling. Most wildcat wells prove to be failures. Of 404 wells drilled in Alberta in 1960, no less than 326 proved to be dry. Figure 8-19 shows a photograph of an oil rig and drill. On the next page is a diagram of such a drill. The drill may be up to 140 feet high. Many sections of pipe are kept beside each oil drill, to extend its length as it may be necessary to probe very deeply. The deepest well ever drilled in Canada was nearly three miles below the surface. Notice the mud hose and mud pump in the diagram. In drilling, large quantities of a special kind of mud are poured into the well. This mud is filtered and re-circulated as shown in the diagram. It helps to cool the drilling bit, to flush out cuttings, and control underground pressure. Besides the mud pump, there are engines that raise and lower the drill and rotate it in the hole. The casing is a large hollow pipe that prevents the hole from caving in and it contains the drill pipe. At the end of the drill pipe is the bit. Figure 8-22 shows some men installing a new bit at the end of a drill pipe.



8—21 Diagram of a rotary drilling rig

8—22 Changing the bit on an oil drill (Alberta Government photo)

Many promising drilling areas are in remote places, such as Brazeau, 100 miles southwest of Edmonton. The well is shown in Figure 8-23. Study the photograph and describe the relief and vegetation of the area. This is typical forested country of Alberta's central pioneer fringe, described on page 339. For eight months, huge quantities of supplies were brought in by air because trails became impassable due to

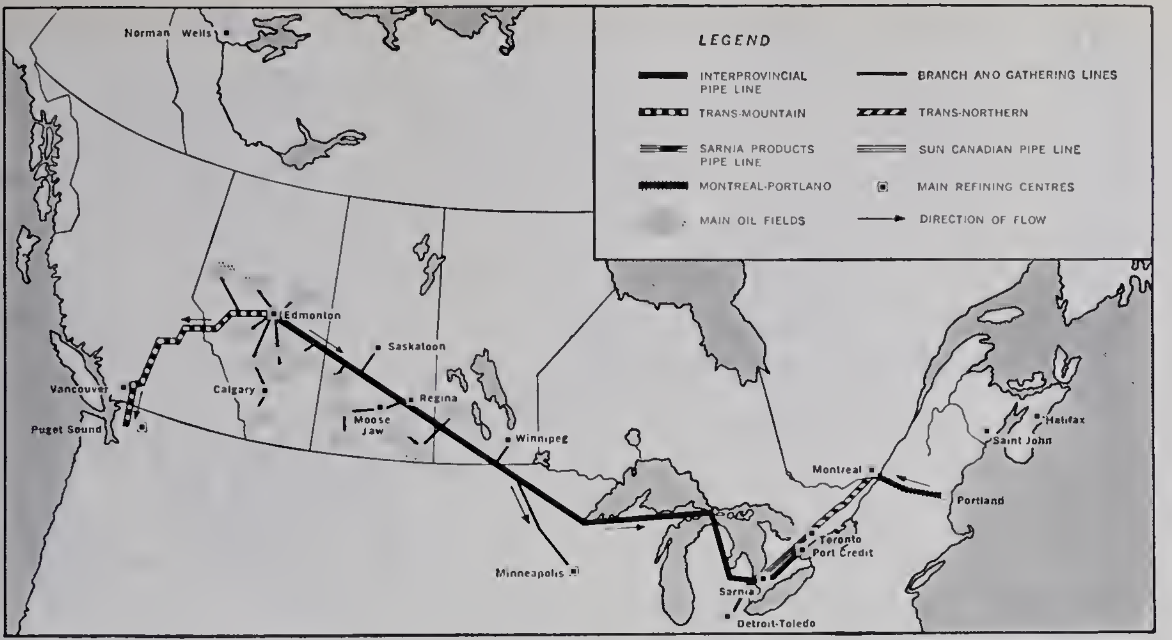


8—23 Drilling for oil in a remote part of Alberta's central pioneer fringe (Imperial Oil Co. photo)

muskeg and a wet summer. Locate the landing strip, the drilling rig, the living quarters, and storage tanks in the photograph.

Once oil has been struck, it must be transported and refined. Tanks, trucks, railway cars, and oil tankers are all used, but pipelines have become the cheapest and most efficient method. Figure 8-24 shows the main oil pipelines now in use in Canada. Note how Edmonton is the main focus of pipelines in Figure 8-24. Name the line that supplies Canada's Pacific coast. To which United States area does this line supply oil? Trace the route of the Interprovincial Oil Pipeline. To which important prairie cities does it send branch lines? Which Ontario city is its terminus? This line is 1930 miles in length. Note the line from Portland to Montreal. This is the chief competitor of the prairie pipelines and delivered an average of 216,000 barrels of oil per day to Montreal in 1960. Where does this oil come from? What advantages do foreign oil sources have over Alberta in meeting Eastern Canada's oil needs? Name the two leading refining centres in Eastern Canada. Note the other oil refining centres on this map. Nearly all crude oil used in the four western provinces is produced in Canada.

What advantages do pipelines have over other means of transporting oil? Construction of line is costly. First, a good route must be surveyed. The owners of all lands through which a pipeline will pass must be compensated. Ditching machines dig a trench of the exact width and depth required. Truckers and welders haul in lengths of



8—24 Main oil pipelines and refinery centres in Canada

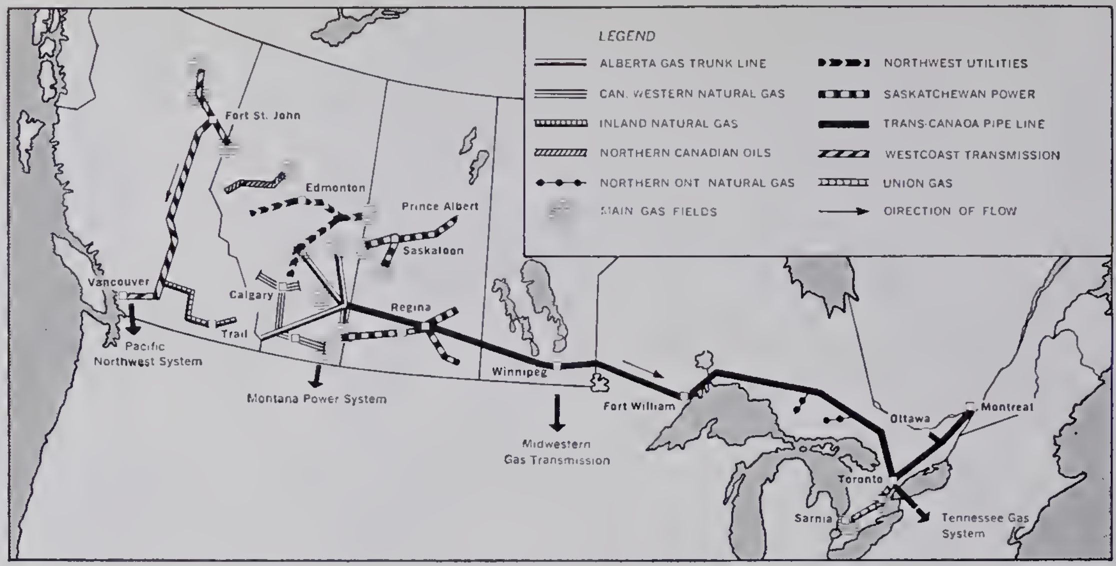
pipe and join them together. Behind them comes a wrapping machine that covers the pipe with a coating of asphalt and felt to protect it from corrosion. A tractor with a crane on one side lifts the pipe into the ditch. Finally, the earth is replaced and fences rebuilt. Soon the land looks much as it did before. The farmer can even plough it again, for the pipe is buried deeply.

Every 30 or 40 miles a pump station is erected to keep the oil moving through the line. Oil moves steadily, silently, and unceasingly. The movement is so efficient that 430 ounces of oil can be sent from Edmonton to Sarnia for five cents — exactly what it costs to send a *one-ounce letter* the same distance.

Oil refining is a complex process that produces the primary products of gasoline, kerosene, lubricants, heavy fuel oils, and asphalt. A wide range of secondary products includes various chemicals such as carbon black, sulphur, and industrial alcohol.

Natural gas comes out of the ground, sometimes with crude oil, but not always. It is usually invisible, but is sometimes so wet that it looks like fog. It is usually highly inflammable. When the hydrogen sulphide content is high, it smells like rotten cabbage. Usually, however, natural gas is almost colorless and odorless. Commercial firms add an odor so that consumers can detect leaks in their gas appliances.

Figure 8-25 shows the major gas pipelines in Canada. Describe the route of the Trans-Canada Gas Pipeline. Housewives in Montreal can cook with gas that has come to their kitchens from Edmonton, nearly 2000 miles away. In recent years, Canada has begun to export large



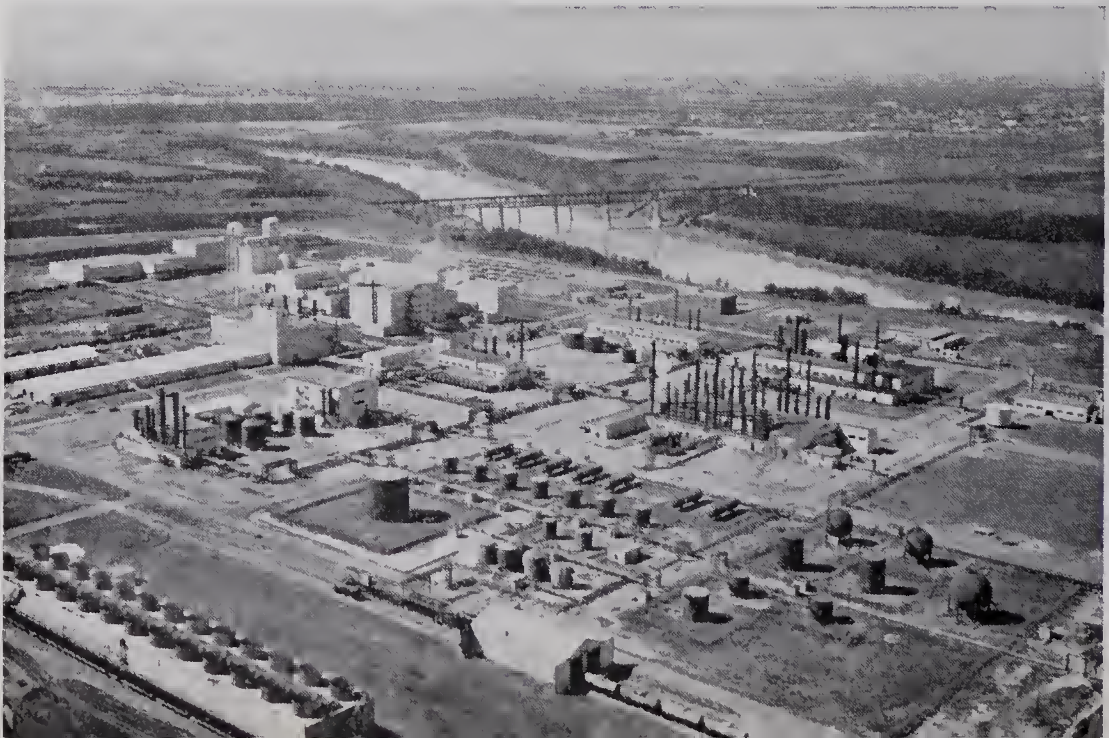
8—25 Major natural gas pipelines in Canada

quantities of this fuel. To which United States areas is natural gas being sent, according to Figure 8-25? These markets now buy nearly one fifth of Canada's total output.

Chemists have discovered how to change natural gas into a variety of products. Butane, for example, can be changed into rubber. Nylon clothes, some varieties of toothpaste, antifreeze, and ammonia for fertilizer are other goods made wholly or partly from gas chemicals. Polyethylene is the most widely used synthetic made from natural gas, and may be used for raincoats, unbreakable toys, ice trays, and plastic film.

Figure 8-26 shows a large petrochemical plant located on the bank of the North Saskatchewan River near Edmonton. Here various

8—26 A petrochemical plant on the bank of the North Saskatchewan River near Edmonton (Alberta Government photo)



products already named are manufactured from oil and natural gas. After studying pages 360-361, state why this is a good site. Describe the relief of the land there. Note how the North Saskatchewan River has entrenched itself in the prairie. In the far distance are oil storage tanks and other evidence that Edmonton, with wealth derived from the pool of "black gold" beneath it, is expanding out over the prairie.

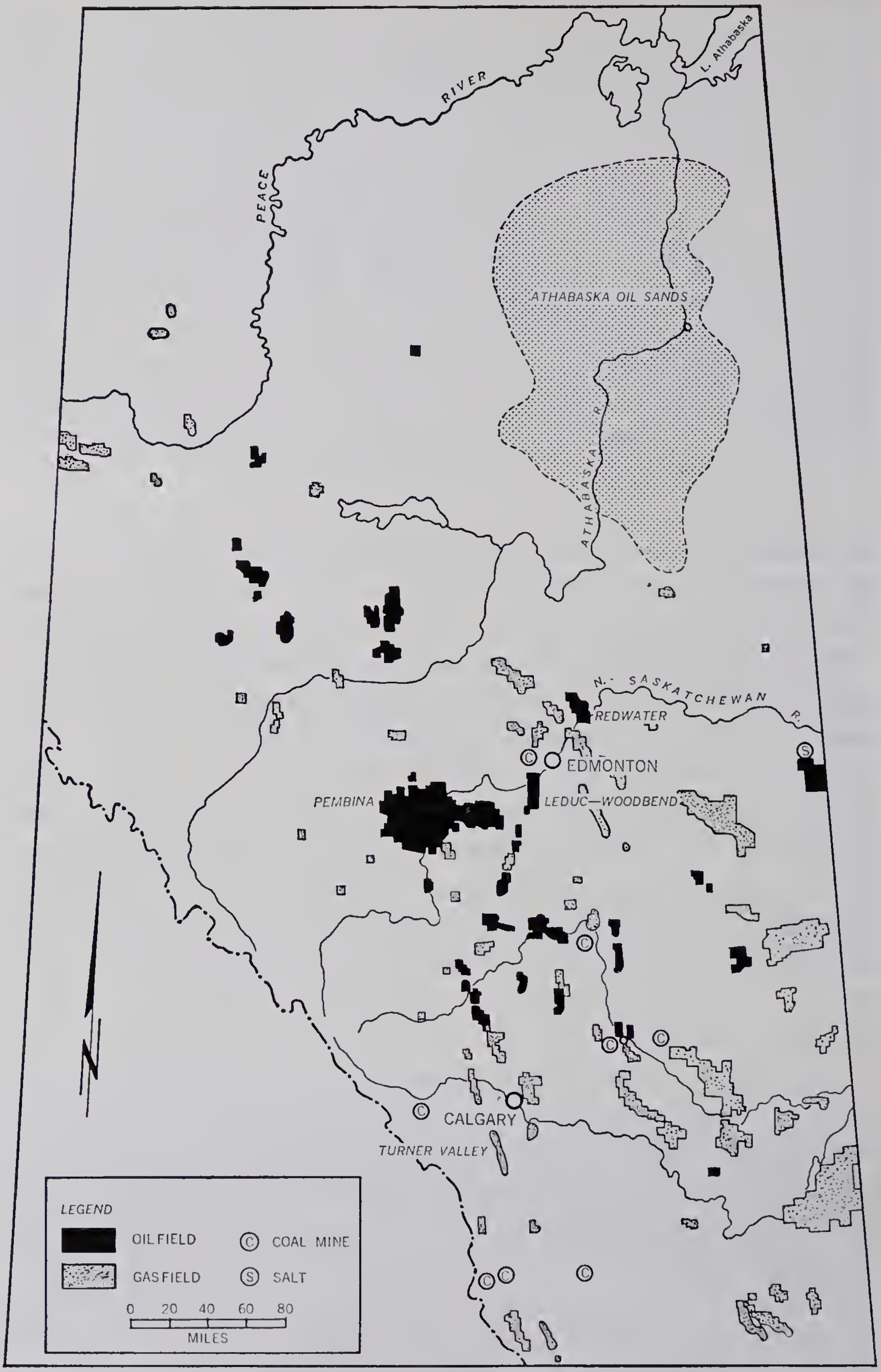
Figure 8-27 shows the distribution of Alberta's mineral wealth. Note the location of the main oil fields. Where are the largest gas fields concentrated? Most oil fields produce some natural gas too. Altogether, the province has more than 120 producing oil fields and nearly as many gas fields. The largest oil fields in terms of production are Redwater, Leduc-Woodbend, Pembina, and the Turner Valley, in that order. Together, these four fields have produced nearly two thirds of the province's entire output so far.

Note the important oil and gas fields of the Peace River area. Where do these lie in relation to Grande Prairie? They extend over to the British Columbia side of the district and have helped to make "boom towns" of Dawson Creek and Fort St. John (see pages 428-429).

Where are the Athabaska oil sands located in Figure 8-27? These sands contain a tar-like substance called *bitumen,* which consists mostly of oil. The Athabaska oil sands are believed to contain the largest oil reserves in the world. However, as yet no cheap, efficient way has been found of extracting the oil from the sand. Various experiments have been attempted and some companies have considered plans for the construction of railways, roads, and pipelines into the area. It is possible that as the world's needs for oil increase, the Athabaska sands may some day assume international importance. Early in 1963, the first plans for large-scale production were announced, to begin in 1966.

It is estimated that half of all money earned in Alberta can be traced, directly or indirectly, to the oil and natural gas industry. Think of some jobs that are dependent on the industry. Earnings from royalties and from the lease or sale of oil and gas rights are a major part of the revenue of the provincial government. The industry has influence far beyond the borders of the province. Many homes and industries in Southern Ontario and Quebec are dependent on oil and gas from Alberta. This mineral wealth has become one of Canada's chief exports to the United States.

Such a valuable resource must be carefully developed. The Alberta Oil and Gas Conservation Board has been set up "to effect the conservation of the oil and gas resources of the province" and "to prevent



8—27 The minerals of Alberta

the waste of the oil and gas resources." The staff of 150 people includes about 85 engineers, geologists, and technicians. This staff studies every oil and gas field in the province. A well records department maintains a file on each well in the province. Every operator must apply to the board for a license to drill a well and drilling operations are supervised by Board employees. Once a well has been brought into production, a *maximum permissible rate* (M.P.R.) is set for it. This is based on the type and quality of the oil, the estimated amount, and the probable life of the well. The Board divides the estimated total market each month among all the wells in the province. This is a means of preventing waste and assuring a fair share of the market to all operators.

The Board may require that additional pressure be applied to a well if the amount of oil production can be increased in this way. Gas conservation is an important part of the Board's work. In many cases, gas must be burned or "flared off" as waste, because there is no market for it. Research into uses of natural gas has made possible some of the primary and secondary products already noted.

Besides natural gas and oil, coal is Alberta's only other important mineral. There is good quality coal around Drumheller in the central region and around Lethbridge to the south and at Blairmore in the Rocky Mountains. The decline of the use of coal as a home fuel and the use of diesel locomotives by the railways has caused a drastic decline in output. This is clearly shown in the following data:

	Production (in tons)	No. of Mines	No. of Men Employed
1947	8,070,430	191	8761
1951	7,659,329	179	7339
1956	4,328,787	104	3443
1960	2,480,707	69	1729

8—28 Coal-mining data of Alberta for certain selected years

Alberta now produces less coal than Nova Scotia, but still accounts for a major share of Canada's output. In 1960, the nation mined about 11,000,000 tons of coal, which was actually a slight increase over 1959. As in Saskatchewan, Alberta's coal is important in the production of thermal-electric power. Many experts see in this, and other uses, a possible end to the steady decline in Canadian coal production since 1945. With an increasing demand for all types of fuel, there may be a slow increase in coal production during the coming decades.*

*Canada is one of the world's greatest importers of coal. In 1960, 13,000,000 tons were imported—more than the domestic production. Nearly all of this amount was brought in from the United States to Southern Ontario and Quebec. Why do these provinces not use Alberta coal?

Much Alberta coal is mined by strip methods, similar to those in Saskatchewan described on page 320.

Alberta's only other minerals of present importance are clay and salt. A large salt deposit is being exploited in the area near Lloydminster, on the Saskatchewan border.

In 1961, Alberta ranked as third province with 18 percent (by value) of Canada's total mineral output. Oil and natural gas were responsible for more than 95 percent of all mineral wealth produced. The wealth and prosperity brought by this industry have helped to make Calgary and Edmonton the fastest-growing Canadian cities since 1945. In 1961, Alberta contained 40 percent of the people of the Prairie Provinces.

Reviewing Alberta's mineral wealth

1. (a) Where is oil usually found and how do scientists believe it was formed?
(b) Describe some important uses of oil and recent trends in Canada's oil production.
(c) Why is exploring and drilling for oil so expensive?
2. Describe the construction of an oil pipeline.
3. What are petrochemicals? Describe some other important products of oil and natural gas.
4. What are the Athabaska oil sands? Why have they not been developed before now?
5. Describe conservation methods used in Alberta's oil industry.
6. (a) Why has Alberta's coal production declined in recent years?
(b) What is the chief use of the province's coal now?

THE CITIES OF ALBERTA

Lethbridge, with a population of 35,000 and Medicine Hat with a population of nearly 25,000 have been mentioned as the two leading centres in the Dry Belt of Southern Alberta. By reference to any available maps and to what has already been learned about them, sum up the reasons for the importance of these cities. Red Deer, in the Mixed Farming Belt to the north, midway between Calgary and Edmonton, is a city of comparable size with similar functions. Its population tripled between 1951 and 1961 when, with nearly 20,000 people, it was one of the fastest-growing cities on the prairies.

No cities approach Edmonton and Calgary in importance and size, however. Refer again to page 328 and note their populations in 1961. No large Canadian cities have been growing so rapidly.

Edmonton: Capital, crossroads, industrial and trading city

The above heading suggests the many functions of Edmonton that have made it a major city of the Canadian West. Fur trading posts were established within the present city limits as early as 1808. Even earlier than this, in 1794 and 1795, posts had been set up about 20 miles downstream. Refer to Figure 8-30 and name the river that the traders followed to reach this site. Fort Edmonton was established in 1820 on a high bluff overlooking this river. Figure 8-29 indicates how, in the vicinity of modern Edmonton, farms and factories have been established on its banks. The first homesteads at Edmonton were settled in 1871. The township survey system (see Figure 6-14) was extended there in that year, when Edmonton was incorporated as a village. At that time, it was more than 700 miles west of the nearest settlement at Portage la Prairie, Manitoba. Communication was by oxcart, a journey of several months in those days. The city's early growth was slower than that of Calgary because the railway did not reach the city until 1891. The first line, with its terminus on the south bank of the river, was an extension of the transcontinental line from Calgary. Today, with eight lines radiating from it, Edmonton is one of the great railway centres of Canada.

The site, land use, and functions of Edmonton

1. Figure 8—29 is a land use map of Edmonton. (See page 359.)

(a) By reference to this map and to Figure 8—26, describe the nature of the North Saskatchewan River at Edmonton.* This valley is quite deeply entrenched and averages 160 feet in depth. The Saskatchewan meanders considerably about 20 to 30 feet below the valley bottom. It averages 200 yards in width. How many bridges have been built across it? The stream bed contains mud and sand and there are many shallows and bars. The river varies in flow considerably, with the peak reached in late June. Freezing takes place about November 15, and ice usually reaches 30 inches in thickness before breakup about April 15. What problems does the North Saskatchewan present to the city of Edmonton? The river is important as a source of water and sewage disposal. Its terraces and bars, once a source of gold, now provide road and construction materials. What special use of the valley and tributary ravine lands is depicted in Figure 8—29? Edmonton has more parkland in proportion to its population than most Canadian cities and most of it is located in the valley lands.

(b) On which bank of the river has the main part of the city developed? This flat upland on which the city is built averages 2200 feet above sea level. Locate Strathcona which was formerly a separate town and was united with Edmonton in 1912.

(c) Describe the location of the central downtown industrial and commercial area. What form of transportation is important there? Why has the river not been significant in this respect?

(d) Describe the location of the main industrial areas outside downtown Edmonton. Compare these in extent with the downtown area. Most of this development has taken place since 1945. In which direction from the city have the largest developments taken place? What form of transportation serves these areas? Note their relation to the metropolitan boundaries. What problems does this create for the people of Edmonton?

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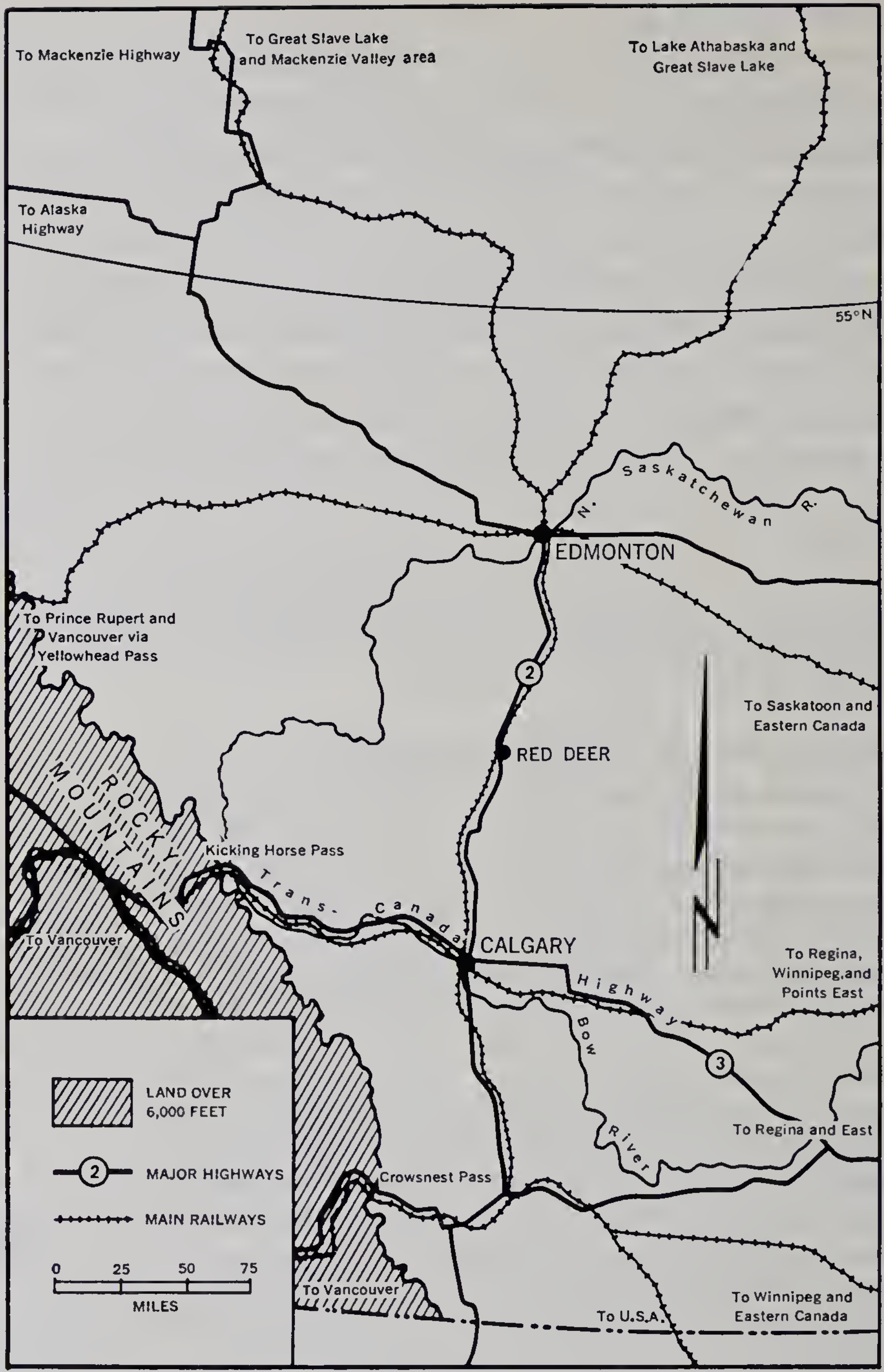
*Part of this account is based on "River Valley City—Edmonton on the North Saskatchewan," from the *Canadian Geographer*, No. 14, 1959, by Professor W. C. Wonders.



8—30 The "crossroads" function of Calgary and Edmonton

8—29 (opposite) Land use map of Edmonton

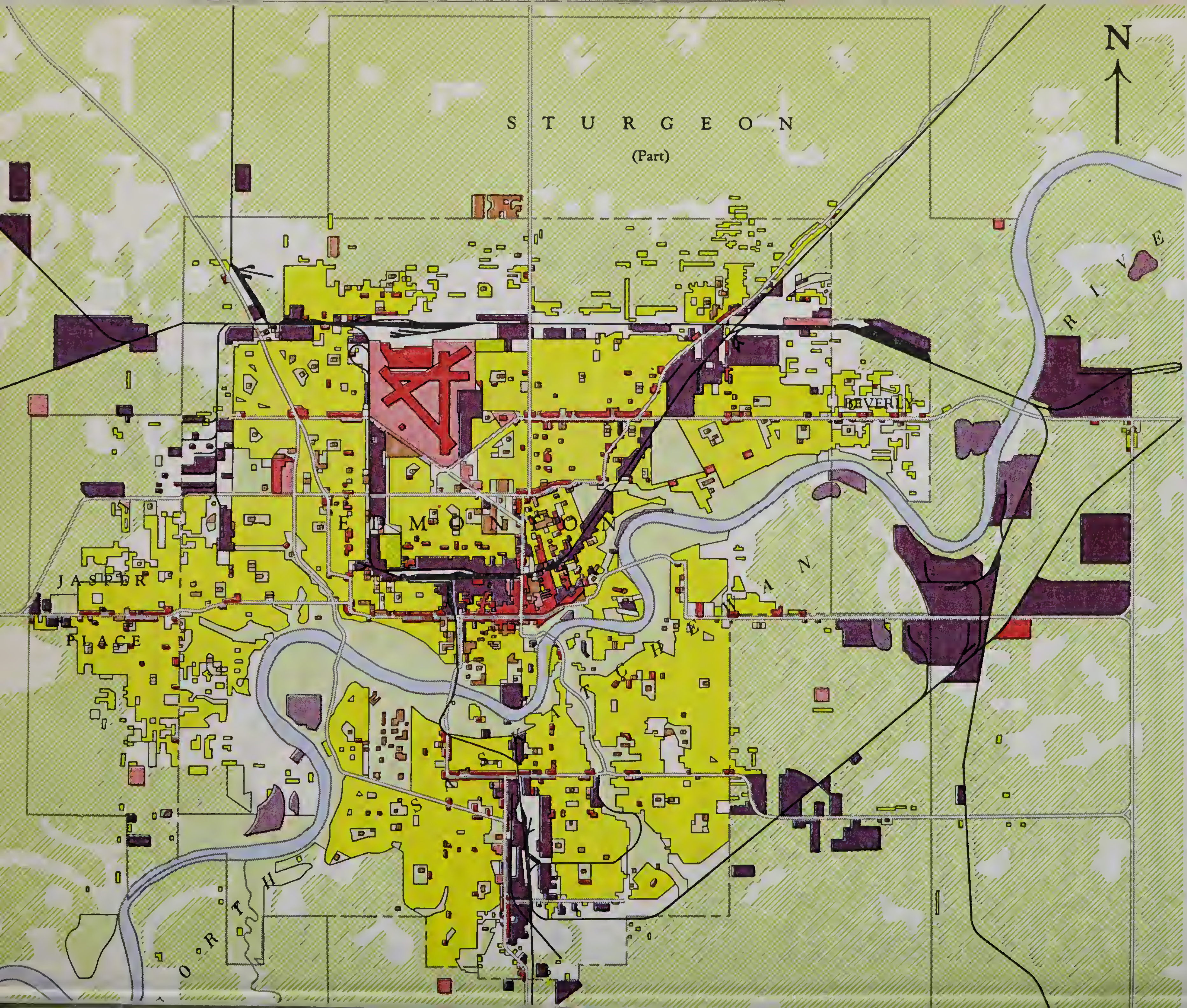
(e) Which form of land use occupies most of the acreage within the city limits? Comment on the land use of the surrounding countryside.

2. Edmonton's functions as a crossroads city and transportation centre are clearly shown in Figure 8—30.

(a) Compare the latitude of Edmonton with that of other large Canadian cities and with that of your neighborhood. How much further north is it than Kapuskasing, Ontario?

(b) How does the general location of Edmonton in Alberta suggest reasons for its importance and rapid growth?

(c) Which pass through the Rocky Mountains is reached from Edmonton? Which



8—29 Land use map of Edmonton in the scale of 1:100,000 (from **Atlas of Canada**) city — Calgary or Edmonton — is closer to the Rocky Mountains? Suggest why this is a disadvantage to Edmonton.

(d) Edmonton lies on a main rail route between Vancouver and Winnipeg. Estimate its approximate distance from these cities.

(e) What evidence did Figure 8—29 provide that Edmonton is a major air centre?

(f) Refer again to Figures 8—24 and 8—25 and suggest other important transportation functions.

3. From your study of agriculture and petroleum in Alberta, list some processing and secondary industries that you would expect to find at Edmonton.

Only Calgary among large Canadian cities has such good and varied sources of power close at hand. Oil and natural gas are, of course, the chief of these. Important coal deposits around Edmonton have been exploited since the early days. Electricity can be generated from diesel units as well as from thermal plants using both coal and natural gas. Hydro-electric power is also available in the Rocky Mountain region to the south and west.

As a trade and transportation centre, and as a manufacturing city processing farm and petroleum products, Edmonton has an assured basis for future growth. In time, it may surpass Winnipeg as the largest prairie city. In 1905, Edmonton became the capital of Alberta. The University of Alberta was established on the south bank of the river. These political and educational functions are of continuing importance today.

West of Edmonton, Jasper Place has grown rapidly as a separate, mainly residential city. Its 30,000 inhabitants in 1961 made it the fourth city of Alberta. Twenty miles to the east, Fort Saskatchewan has developed as an interesting "satellite" industrial town.* Although containing less than 4000 people, Fort Saskatchewan is a good example of the influence of modern industry on an agricultural settlement. It was a small community of only 1000 inhabitants in 1950. In that year, the company which owns the great nickel mines at Lynn Lake, Manitoba (see page 292 in Chapter 6), decided to establish a nickel refinery at Fort Saskatchewan. Natural gas was available as a fuel and raw material in the refining process. Ores are shipped from Lynn Lake via the Canadian National Railways to Fort Saskatchewan, which is on the transcontinental line. A new provincial highway also serves the town. A large area of land (800 acres) was required on the banks of the North Saskatchewan River. This land was much cheaper than in Edmonton and taxes were lower. The river supplies ample water, which is needed in the refining process. Cheap land was also

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*This discussion is based on "Fort Saskatchewan, An Industrial Satellite of Edmonton," by Professor P. J. Smith, published in *Plan*, May, 1962, the journal of the Town Planning Institute of Canada.

available for the workers' homes. About 15 percent of the workers commute from Edmonton which is the chief business and commercial centre for people of the town.

The nickel refinery produces various by-products, including fertilizers and iron oxide. Three other companies have been attracted to Fort Saskatchewan. One makes fibre glass for insulation of oil and gas pipelines. Two chemical plants manufacture sulphuric acid, antifreeze, and various chemicals. All told, 650 people are employed in the new industries. The town is really a suburb of Edmonton and its ties with that city are very strong. Development is being carefully planned and the Edmonton District Planning Commission regards Fort Saskatchewan as a possible model for the future development of satellite towns in the district. With nearly 30 percent of Alberta's population concentrated in an area of only 4000 square miles, it is important that future development be carefully controlled. Review the factors that have led to industrial development at Fort Saskatchewan. Study Figure 8-26 again. What similar factors have probably encouraged this development?

Calgary: Alberta's second crossroads, industrial and commercial centre

Although Calgary is about 150 miles from the international boundary, it is on the main routes of traffic to and from the United States. All such traffic from the Edmonton Region of central Alberta and from northern Alberta passes through or near Calgary. Which famous pass through the Rocky Mountains to the west gives Calgary access to British Columbia? Give reasons why Calgary is better situated than Edmonton to take advantage of the tourist trade. Figures 8-30 and 8-32 indicate its importance as a railway centre. Transportation has been the key to Calgary's development from the beginning.

We shall now investigate how Calgary has grown in 85 years from a police outpost to a metropolitan area containing 265,000 people. The larger hinterland of Calgary extends over 75,000 square miles, containing 500,000 people.* This huge area (larger than the three Maritime Provinces) has developed into a major prairie region since 1945. More than 60 percent of its population has been added since that year.

In 1875, Calgary was a Royal Northwest Mounted Police post. Possibly the most important event in its history was the arrival of the

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*Materials and maps used in this study have been based partly on "Calgary: A Study in Urban Pattern," by Prof. P. J. Smith, which appeared in *Economic Geography*, October, 1962.

Canadian Pacific Railway in 1883. The city soon became the chief railway maintenance centre of the western prairies. Farmland opened up and many branch railway lines were built. In 1887, the first stockyards were opened. Various processing industries based on local ranching and farming activities soon developed. The greatest period of early growth was between 1901 and 1911, as shown by these figures:

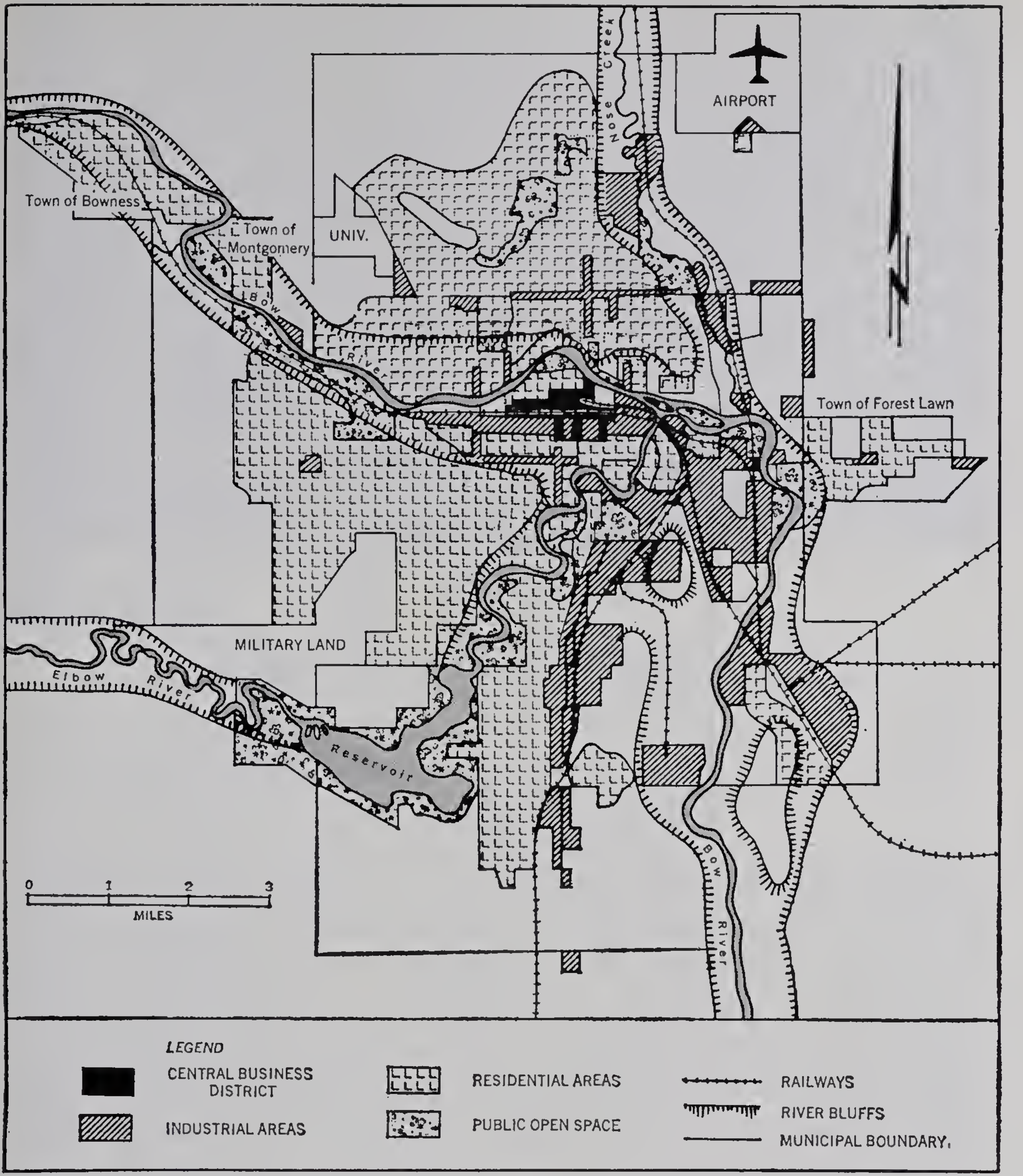
Population in 1901	4,091
Population in 1911	43,704

In 1904, the first irrigation district was established east of Calgary. After 1911, oil was discovered in the nearby Turner Valley and this sparked another great boom in the city's growth.

The site, land use, and functions of Calgary

1. Figure 8—31 is a land use map of Calgary.
(a) On which river is Calgary located? Describe the course of this river through the city.
(b) Name two tributaries of the Bow River. Which one provides Calgary's water supply?
(c) What are the main uses of the Bow River to the people of Southern Alberta? Although it flows through dry country around Calgary, the Bow River never dries out and maintains a remarkably even flow in all seasons. Why is this?
(d) Describe the location of the central business district of Calgary.
(e) Describe the location of the main industrial area in relation to the Bow and Elbow rivers.
(f) Describe the location of most of the residential area of Calgary.
(g) Where is Calgary Airport located?
(h) Where is most of the city's parkland found? Compare Calgary with Edmonton in respect to location of parkland.
(i) What evidence does the map give of an educational function of Calgary?
(j) What relationship do you notice between railways and (1) river bluffs, (2) industrial areas?
(k) Suggest why there has been greater industrial and residential development of the Bow River Valley than the Elbow.
2. Calgary's importance as a railway centre is shown in Figure 8—32.
(a) In which directions do the greatest movements of freight take place?
(b) With which Alberta cities does Calgary do the greatest freight traffic business? Describe some of the items of freight carried.
(c) Why are the lines on this map of varying width?
3. Figure 8—33 is an aerial view of Calgary showing the main downtown district, south of the Bow River. Which mountains are visible in the far distance? Note the foothills area before these mountains are reached.
4. Which sources of power are available to Calgary? How does it compare with Edmonton in this respect?
5. Summarize the main reasons for the growth of Calgary.

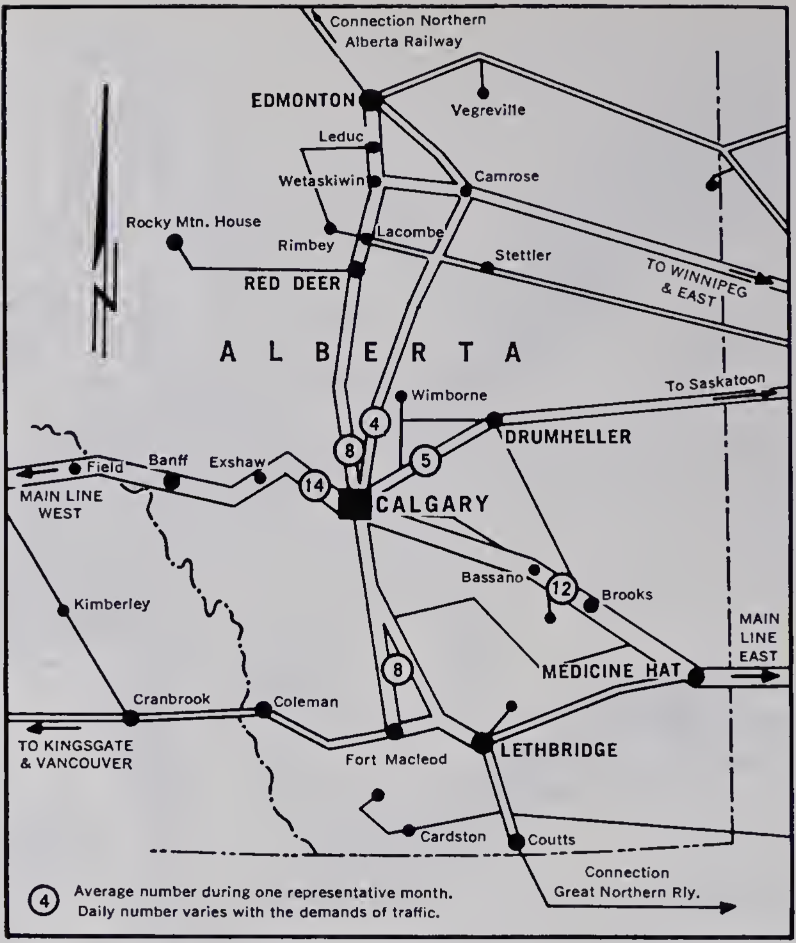
Since 1950, many new commercial and industrial areas have been established on the outskirts of Calgary. In that year, the built-up area



8—31 Land use map of Calgary, showing the relationship between railways, industry, and the river bluffs (after Professor P. J. Smith)

had a radius of only 2.5 miles and there were six shopping centres outside the central business district. By 1961, the radius of the built-up area was five miles and there were 60 local shopping centres. Two of these were very large ones, each with a department store and 50 other stores, as well as offices and various services. Most of these shopping centres have been established to the north and west of the city. How does the land use map help to explain this fact?

The central business district of Calgary remains important, but as in most growing metropolitan areas of Canada, it has lost some ground to the new suburban development. Downtown Calgary suffers from the fact that so many railway tracks break up the street pattern. The Cana-



8—32 Daily railway freight movement into and out of Calgary

dian Pacific Railway alone has more than 100 miles of track within the city limits. Old, multi-storey warehouses, located on narrow streets, present another problem. Most goods are now carried by truck and lack of off-street loading space is a difficulty in downtown Calgary. The suburban shopping centres have large parking areas and single-storey buildings that are easily serviced. As these centres have developed, there has been much less dependence on the central business district for goods and services.

The new commercial and industrial areas are well served by the six railways and four main highways of the Calgary Region. Many of these have been established to the south of the city, between Highway Number 2 (see Figure 8-30) and the Bow River. Most of the land there is city-owned and is much cheaper than that in the crowded downtown area. Note the large area of unoccupied land south of the central business district in Figure 8-31. Most of this is available for future industrial development.

"Ribbon development" is taking place along the main highways around Calgary. The main used car lots extend for two miles along Highway No. 2, south of the city. In 1960, the construction of the first large office building outside the central business district marked a further stage in the expansion of Calgary.

8—33 Aerial view of Calgary (Trans-Canada Airlines photo)

By 1980, metropolitan Calgary will probably contain 600,000 people. This growth will likely continue to be influenced by the river valleys, the railways, and the highways. The older industries—railway maintenance, meat packing, flour milling, and the manufacture of dairy products—will no doubt remain important. The newer industries—oil refining, the manufacture of petrochemicals and construction materials—will develop at an increasing rate. Construction materials (such as cement, insulation, and finished lumber) are of special significance in a fast-growing city where the rate of home building is the highest in Canada. The manufacture of tires, fertilizer, explosives, and structural steel are specialized industries that give employment to many hundreds of workers. Although Edmonton is a more important centre for the transportation, distribution, and processing of oil, Calgary is the commercial headquarters of the industry. Every major oil company in Canada has offices there and this has contributed greatly to the city's growth. More than 30,000 United States citizens live in Calgary—many of them employed by the branch offices of American oil companies.

CONCLUSION: ALBERTA AS A WHOLE:
A FINAL LOOK AT THE PRAIRIE PROVINCES

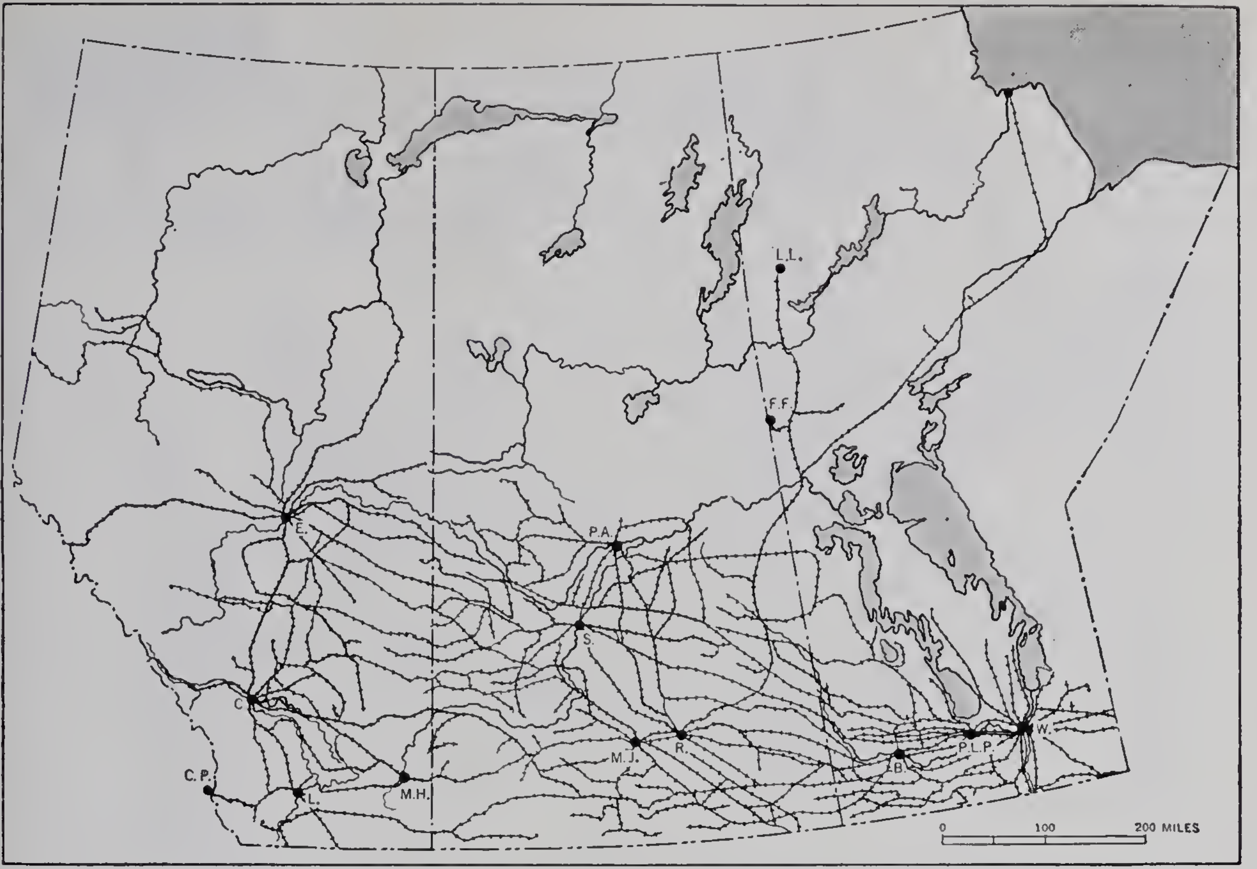
Discuss answers to the questions asked at the beginning of this chapter. Our study of Alberta leads us to consider the geography of the Prairie Provinces as a whole. Why is this name not a good one in many respects? Why is it unwise to treat even the prairie section itself in these provinces as a single region? A number of separate regions—each usually related to a major city—seem to be developing in the southern half of all these provinces. What are these regions? This trend towards *regionalism* in the Canadian West is thus very important. Suggest some features that the prairies have in common. Figures 6-8, 6-9, 6-10, 6-25, and 8-11 will be helpful in considering this.

The three Prairie Provinces contain two thirds of all Canada's occupied farmlands and more farms than any other region. In 1959, nearly half of Canada's total farm income came from these provinces. Yet the rural population is steadily declining and more than half the people now live in towns and cities. However, the size of farms is increasing. In 1911, the average Saskatchewan farm consisted of 296 acres; by 1951, this had increased to 551 acres. The total amount of improved land is as great as ever. The total production of crops is greater than ever, as crop yields have risen. Why is it possible to maintain larger farms, grow bigger crops, and cultivate as much land as in the past when fewer people are now engaged in farming? More land is irrigated every year, more varied crops are being raised, and there is a strong trend towards mixed farming.

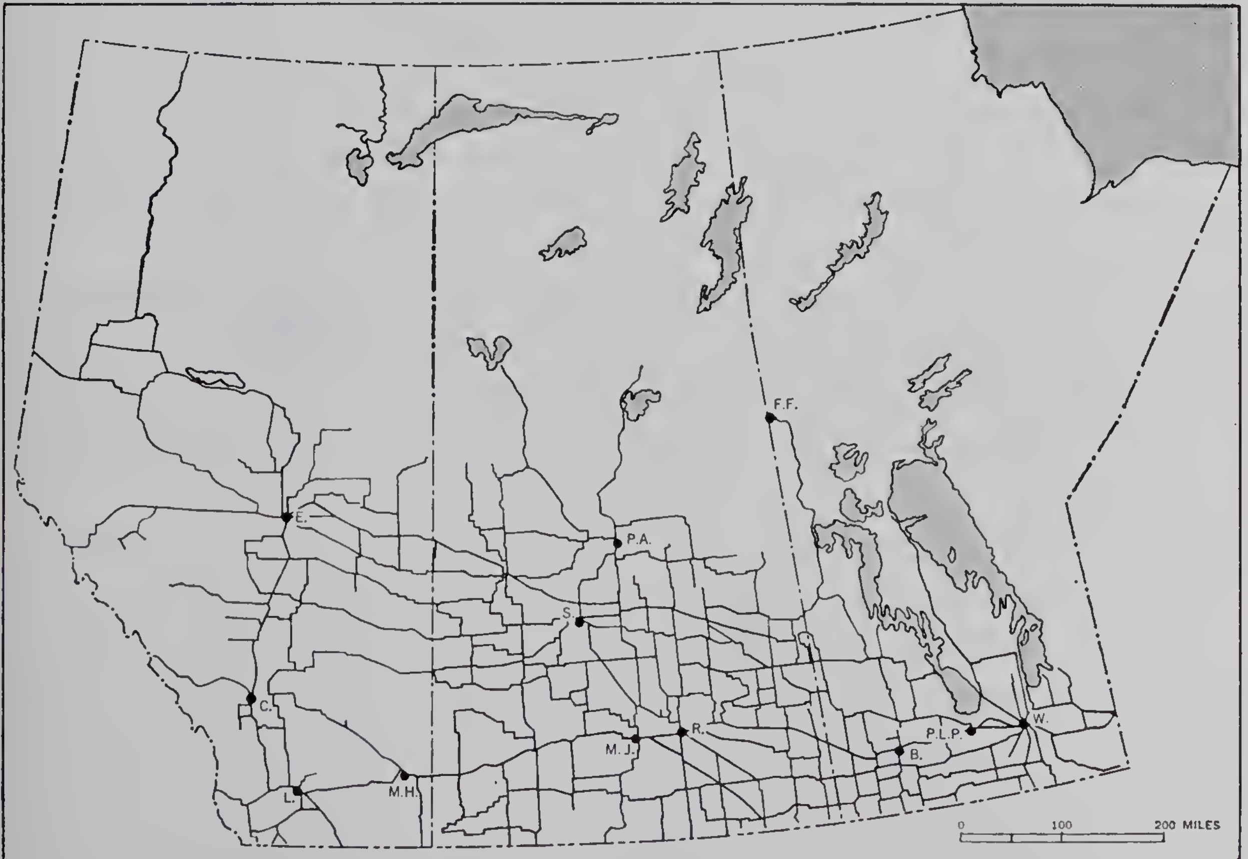
The farmers of the prairies have learned to co-operate very closely. The largest grain elevator on the waterfront at Port Arthur is owned by the Saskatchewan Wheat Pool. This is one of several organizations that grain farmers have established to sell their crops. There are many different kinds of *co-operatives* on the prairies. Most Canadian wheat is now sold by the Canadian Wheat Board. This government agency sets prices for the crop and establishes quotas to ensure that each district receives its fair share of the market. Canada has signed agreements with many other countries that assure fair prices for wheat. Most farmers are now covered by hail, frost, and drought insurance, which reduces their losses when the climate is unfavorable. The work of the Prairie Farm Rehabilitation Administration should be reviewed on pages 314-318.

The need to co-operate has helped to produce the friendliness for which prairie people are noted. In the "wide open spaces" where neighbors may be several miles apart, neighborliness is as real as on a crowded city block—and more necessary. At the same time, the prairie people are proud of the way in which those of many different languages, races, religions, and cultures have learned to work together. Great Britain, France, Norway, Russia, Germany, Italy, Poland, the United States—these are only a few of the countries from which people have come to live on the prairies as Canadians.

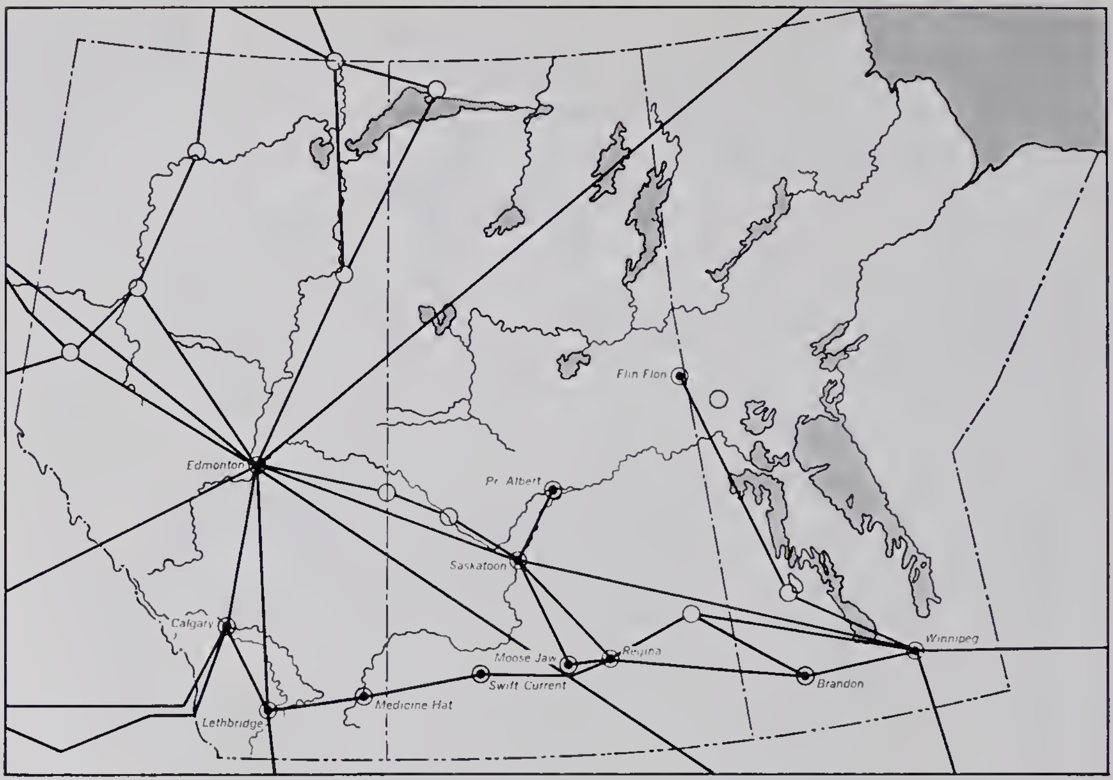
The vast distances of the prairies—where a school inspector may be



8—34 The railways of the Prairie Provinces



8—35 The main roads of the Prairie Provinces



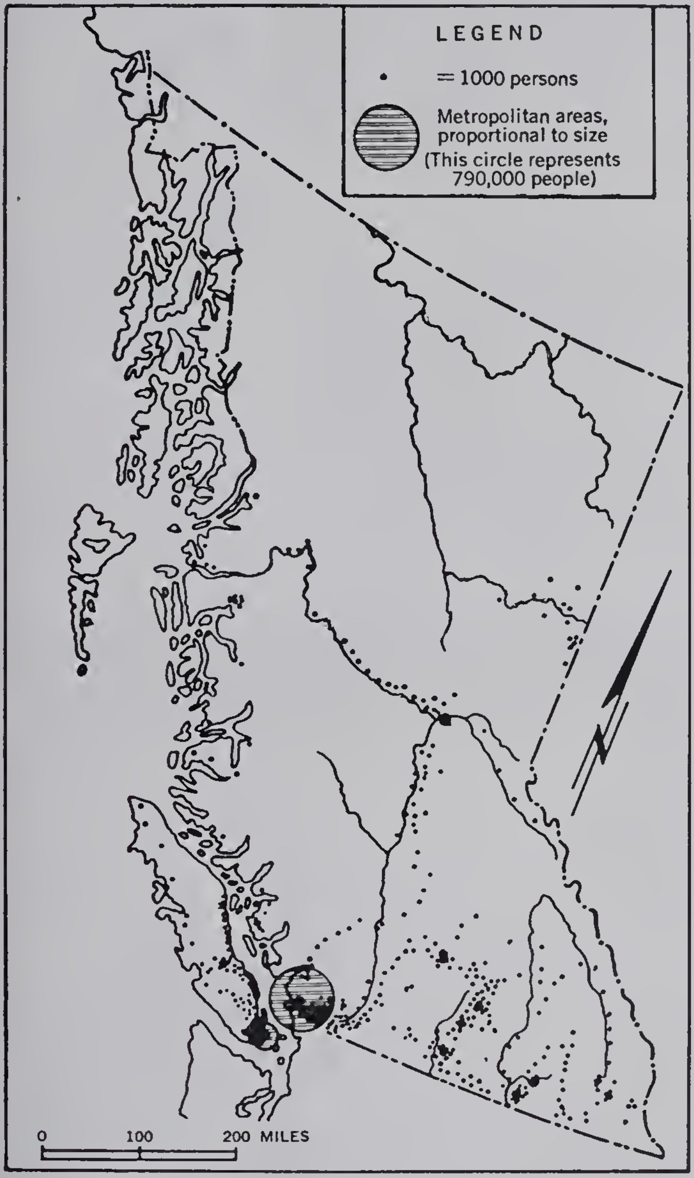
8—36 The main airways of the Prairie Provinces

responsible for an area much larger than Prince Edward Island — has created special transportation problems. The provinces have developed the widest network of road, rail, and air services in Canada. These are shown in Figures 8-34, 8-35, and 8-36. Which province has the smallest area of road and rail networks? Why is this so? Comment on the extent of road and rail mileage in Saskatchewan. Account for the concentration of road and rail mileage in the southern half of all these provinces. Which cities are the main air centres of the Prairie Provinces?

In conclusion, compare the three Prairie Provinces by making a list of some distinctive features of each. Rule a column for each province. In the column for Alberta, you might write "Produces most of Canada's oil." List six or seven features of this kind for each of the Prairie Provinces.

CHAPTER 9

British Columbia: Contrasts in the Mountain Province


LEGEND
= 1000 persons
Metropolitan areas, proportional to size
(This circle represents 790,000 people)
0
100
200 MILES

9—1 The distribution of people in British Columbia in 1961 (Dominion Bureau of Statistics)

9—2 (on pages 370 and 371) Landforms map of British Columbia (By kind permission of the British Columbia National Resources Conference)

INTRODUCTION

The landforms map of British Columbia,* Figure 9-2, and the photographs that accompany it illustrate the title for this chapter. Very few places in British Columbia are out of sight of hills or mountains. Mountains exert a great influence on where the people live and how they earn a living. State some occupations suggested by the photo-

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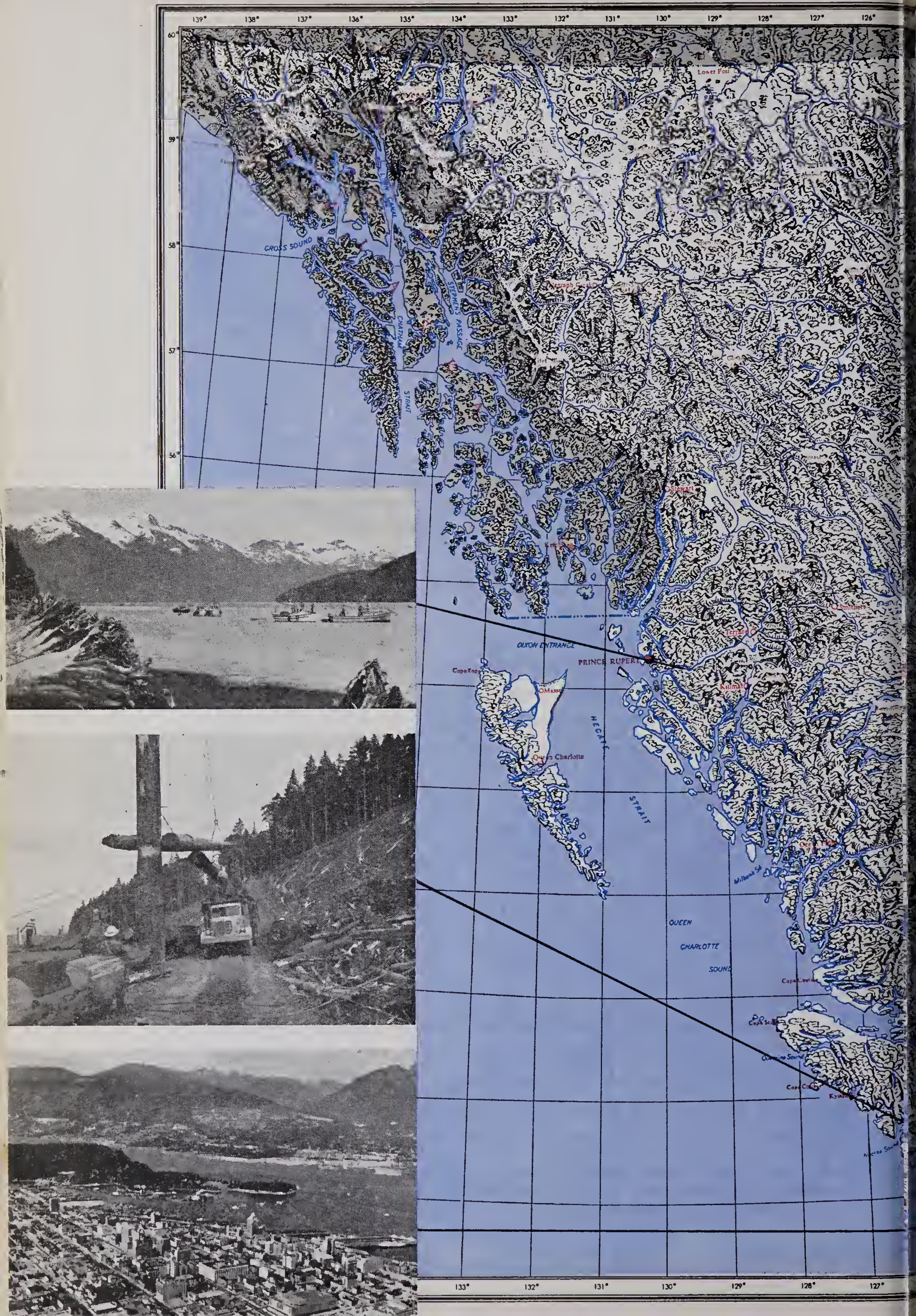
*Such a map shows the forms (mountains, plateaus, valleys, etc.) that make up the relief of the land. It is not the same as a relief map which shows the elevation of the land, usually expressed in feet above sea level.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56°
Lower Post
CROSS SOUND
LYNN CANAL
STEPHENS PASSAGE
CHATHAM STRAIT
Telegraph Creek
Stewart
Smithers
Terrace
DIXON ENTRANCE
PRINCE RUPERT
Cape Knox
Masset
Kitimat
HECATE STRAIT
Queen Charlotte
Milbank Sd.
QUEEN CHARLOTTE SOUND
Cape Caution
Cape Scott
Quatsino Sound
Cape Cook
Kyuquot
Nootka Sound
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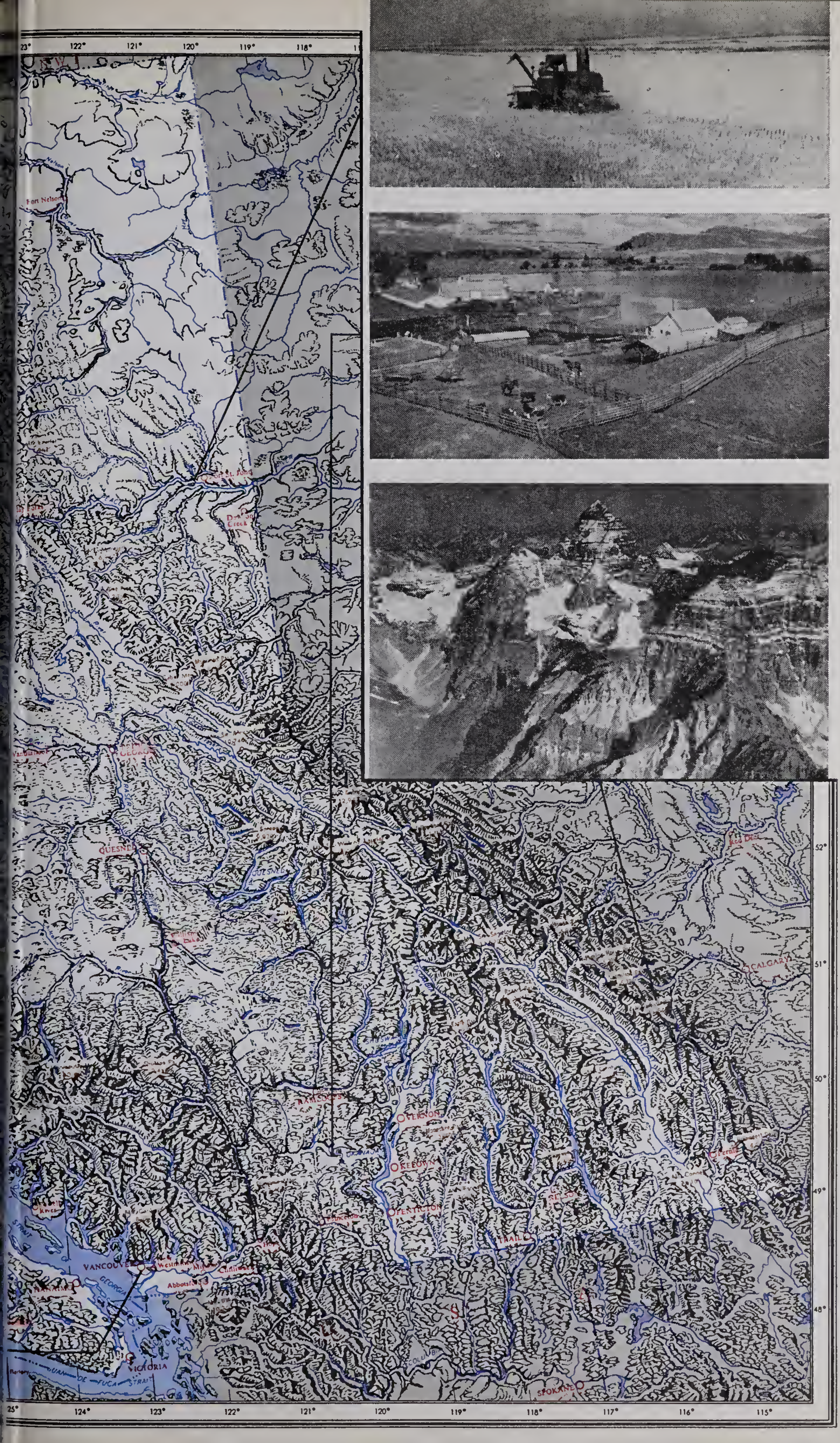

123°
122°
121°
120°
119°
118°
Fort Nelson
Fort St. John
Dawson Creek
PRINCE GEORGE
QUESNEL
Williams Lake
KAMLOOPS
VERNON
KELOWNA
PENTICTON
NELSON
TRAIL
Cranbrook
Red Deer
CALGARY
VANCOUVER
New Westminster
Mission
Chilliwack
Abbotsford
NANAIMO
VICTORIA
SPOKANE
STRAIT OF GEORGIA
JUAN DE FUCA STRAIT
COLUMBIA
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51°
50°
49°
48°
125°
124°
123°
122°
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120°
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117°
116°
115°

graphs. In each case, state one aspect of the physical environment that may help to explain a particular way of earning a living. By referring to such factors as relief, vegetation, and climate, list some ways in which the physical landscape of British Columbia is one of great contrasts. Why are some places covered with dense forests of huge trees, while others have mainly grass and sagebrush? How do such different conditions help to explain the different ways in which man uses the land?

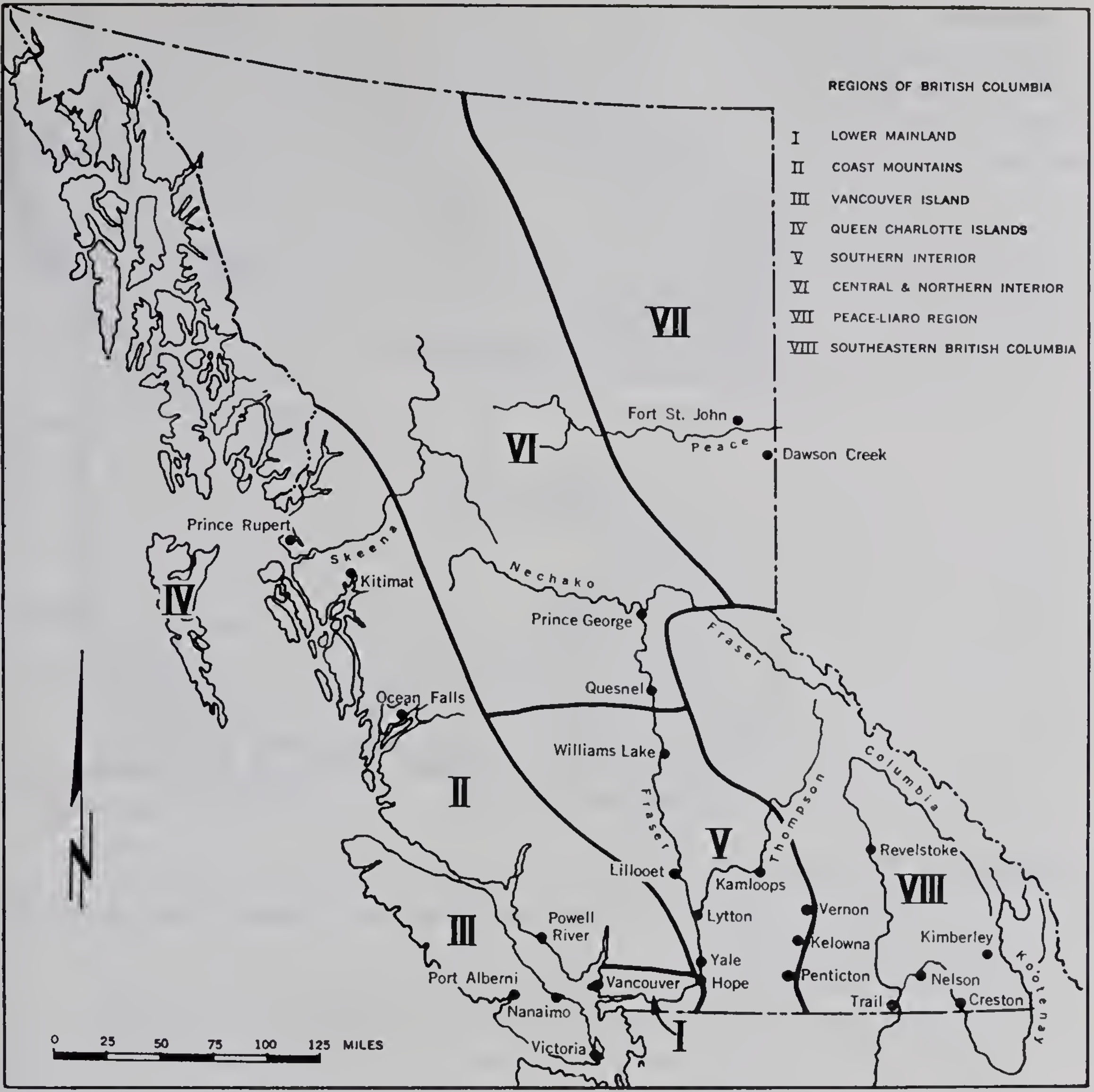
Figure 9-1 on page 369 shows the distribution of population in British Columbia. Where are the majority of the people concentrated? What is noticeable about the distribution in the interior? What connection do you notice between the distribution of population and the river valleys and areas in white on the landforms map? These areas generally consist of land of less than 2000 feet in elevation. Find such an area in the southwestern corner of the province. Name two famous cities of British Columbia located in this corner. The neighborhood of these cities does not generally exceed 500 feet in elevation. What does the landforms map tell us about most of the coast of the province? How does it help to explain why most of British Columbia is uninhabited? What special difficulties of transportation and communication would you expect to find in the province?

Figure 9-3 shows that British Columbia can be divided into many regions. This is because mountain ranges break up a vast area into smaller units with different physical conditions and ways of life. In this chapter, we shall investigate what each region looks like and what it feels like to live and work there. In doing so, we shall find out why British Columbia differs from any other province of Canada.

COASTAL BRITISH COLUMBIA–GENERAL

British Columbia consists of several regions, as shown in Figure 9-3. The Lower Mainland is very small, but is, in many ways, the most important region of the province. How does Figure 9-1 help to suggest why this is so? Much of the Lower Mainland includes the delta of one of Canada's greatest rivers. Name this river. Which famous Canadian city lies near its mouth? The Lower Mainland includes part of the rugged coastal area to the north of this city. From this coast and the nearby mountains, the region derives much of its wealth.

Beyond the Lower Mainland, extending north as far as Alaska, lies one of the most rugged and inaccessible coastlines in the world. Comment on the density of population there, as shown in Figure 9-1. This region is called the Coast Mountains.



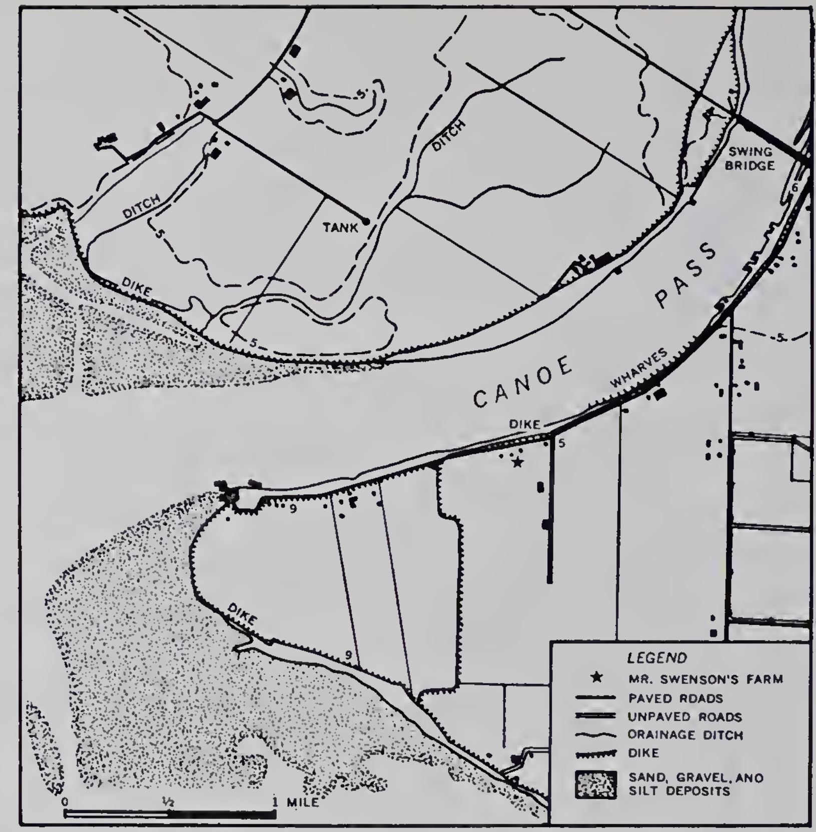
9—3 The geographical regions of British Columbia

Vancouver Island is not a separate region. However, it is convenient to discuss it as a single unit. The southeastern coastal area is similar to the Lower Mainland and is dominated by the capital of British Columbia. Name this city. The rest of Vancouver Island belongs to a region called "The Insular Mountains." The word "insular" comes from a Latin word meaning "island." The west coast of Vancouver Island resembles the Coast Mountains Region in many ways.

Where do the Queen Charlotte Islands lie in relation to Vancouver Island? How far are they from the mainland? In which latitude do they lie? This remote region comprises, like Vancouver Island, an eastern coastal lowland and a very rugged west coast.

THE LOWER MAINLAND—GIFT OF THE FRASER

Our study of the Lower Mainland begins with a visit to a farm near the tip of the Fraser delta, about 20 miles southwest of Vancouver. Mr. Swenson's farm illustrates many features of agriculture in the region.



9—4 Where the Fraser delta meets the sea. Find the Swenson farm on this map

Introducing the Swenson Farm*

1. The farm is located about two miles from the village of Ladner. Locate Ladner in Figure 9—12.

(a) Where does Ladner lie in relation to Vancouver?

(b) Where does it lie in relation to the main channel of the Fraser River?

2. (a) Now study Figure 9—4. The Swenson farm is located beside Canoe Pass, which is part of the mouth of the Fraser River. How wide is Canoe Pass?

(b) What is the approximate elevation of the Swenson farm?

(c) Describe the relief of the land.

(d) What measures have been taken to control flooding in the area and to prevent the soil from becoming waterlogged?

3. (a) What evidence is there that the Fraser River carries vast quantities of material to the sea? This material has been transported from the mountains of the British Columbia interior. Such deposits have built up the great delta on which the Swenson farm is located.

A brief description of the Swenson farm follows:

Mr. Swenson operates the farm in co-operation with his two sons. They employ a hired man who looks after their dairy herd of 40 Holsteins. The farm comprises about 225 acres. The main uses of the land are as follows:

Potatoes	50 acres
Peas	100 acres
Sugar Beets	12 acres
Hay	20 acres
Pasture	20 acres

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*The authors are indebted to Mr. J. Swenson of Ladner, B.C., and to Mr. J. Gray, of the Fraser Valley Milk Producers Association, Vancouver, for arrangements permitting study of this farm and publication of the field data obtained.

Mr. Swenson's father was one of the first farmers in the Ladner area, which was first diked in 1870. The Swenson land was diked in 1895. Like many farms on the Fraser delta, this one is mixed, with income derived from the dairy herd and several cash crops. In addition to his herd of 40 Holsteins, Mr. Swenson keeps 42 head of cattle which he uses to renew the dairy herd. Bulls and calves from this second herd are also sold. The farm produces only a small part of its hay which is rotated with pasture. Alfalfa is purchased from the interior of the province and from the nearby state of Washington. Some local rough hay is bought for the young stock. Milk is shipped daily in 100-pound cans to one of the largest dairy organizations in the Lower Mainland. This organization is owned and operated by the farmer members. Most milk is consumed locally, but some is shipped to Vancouver Island, various coastal points, and to the southern interior of British Columbia.

Peas are the chief cash crop on the farm. They can be grown on the same land for a period of 7-8 years. However, this land must be carefully drained and fertilized. Pea production averages 2½ tons per acre and yields a gross revenue of about $215.00 per acre. Harvesting is done by means of a swather, which dumps the vines into a truck. The truck carries them to a nearby viner station where the pods are removed mechanically. A machine removes the peas from the pods and prepares them for canning and freezing. The refuse is valuable fodder for the cattle and is returned to the farm where it is spread on the fields to dry before being baled. The peas are marketed by means of a co-operative organization. Frozen peas from the Fraser delta are sold as far east as Ontario. Canned peas are sold locally.

Sugar beets are grown on part of the pea acreage over the winter and are harvested during the late spring. They are raised entirely for seed and are sold mainly in Alberta and Manitoba. Potatoes are another major cash crop and up to 1000 tons per year are produced on this farm. Those of poorer quality are fed to the dairy herd. The rest are sent in sacks to the farmers' co-operative, for local marketing.

Levelling of the land, construction of drainage ditches, sprinkling during dry summer periods, and fertilizing of the soil are all measures that require a great deal of work by Mr. Swenson and his sons throughout the year. The potato land is seeded to rye over the winter. Other areas are seeded to clover. Both rye and clover are ploughed back and this, along with the application of manure and other fertilizer, helps to keep the soil rich.

What conclusions can be drawn about farming in the Lower Mainland?

1. What special problems and difficulties must be met? Name another region studied, where similar problems arise.

2. (a) State the main sources of Mr. Swenson's income.

(b) Figure 9—5 shows a dairy herd in a section of the Fraser delta east of Ladner. What features of farming and of the landscape of the Lower Mainland are shown in this photograph?

(c) In addition to the crops raised by Mr. Swenson, strawberries and other small fruits are raised on other farms in the Ladner district. Some farmers raise poultry. **Mixed farming** is thus an important aspect of Lower Mainland agriculture. Twenty-eight different crops are grown in the region. Vegetables, fruit, and pasture crops comprise the most important of these. Dairy produce and poultry provide most of the stock income. Compare farming there with that in your home region.

9—5 A dairy herd on the Fraser delta, east of Vancouver (National Film Board photo)

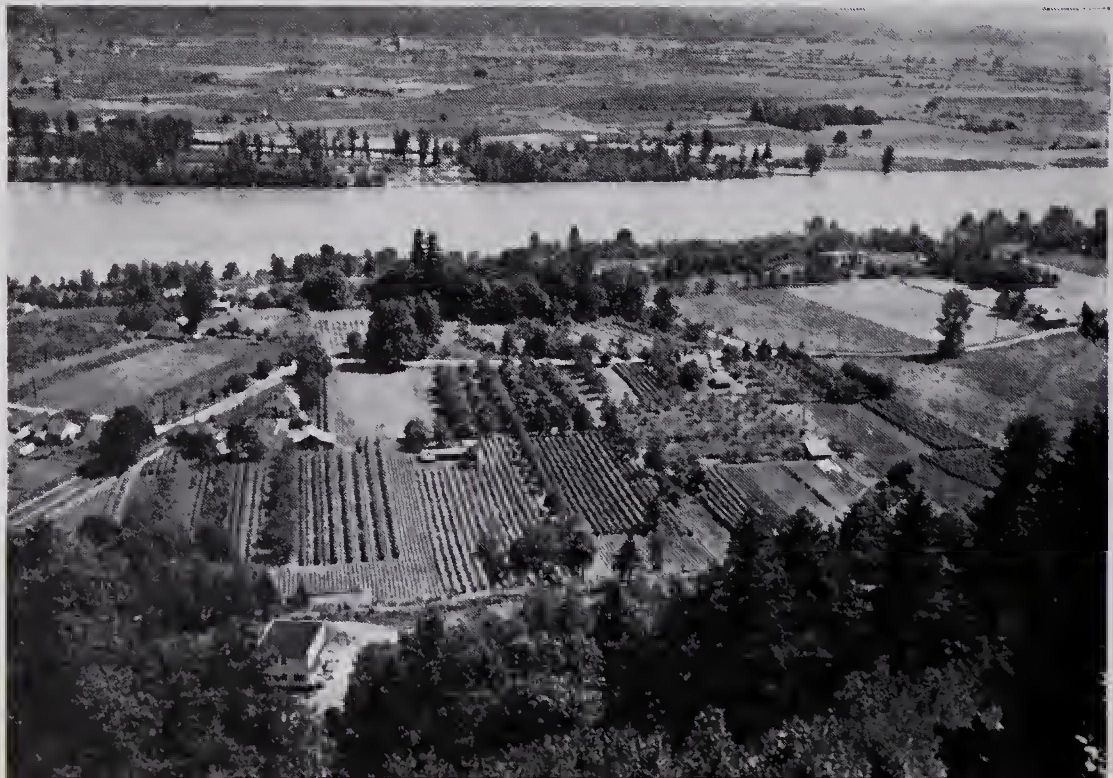
(d) Figure 9—6 shows a scene along the Fraser River at Mission City, about 50 miles east of Ladner. Study the photograph carefully. What does the picture tell you about the intensity and variety of land use in this part of the Lower Mainland? Comment on the relief of the land. Would farmers here face any of the problems faced by those around Ladner. Explain.

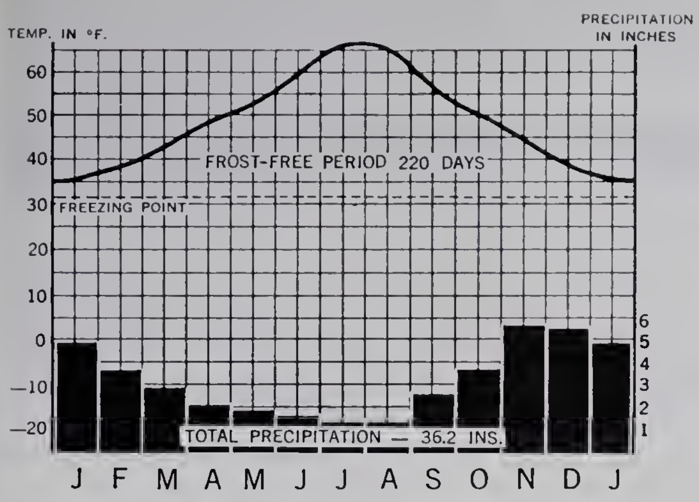
3. Although flooding must be guarded against in the Lower Mainland, by systems of dykes and by drainage systems, **lack** of water is often a problem during the growing season. Thus, irrigation must be practised by many farmers. What method of irrigation does Mr. Swenson use? The necessity for this is illustrated by the climatic graph for Ladner, shown in Figure 9—7.

(a) What is the total annual precipitation at Ladner? How much of this occurs during the six months of April to September inclusive? A period of 15 days during which less than one inch of rain falls is classified by some geographers as drought. Would you expect to find drought conditions sometimes, during July and August, at Ladner? During the very dry summer of 1958, practically no rain fell in July and only one inch was recorded in August.

(b) Other parts of the Lower Fraser Valley receive much more precipitation than Ladner. Mission and Chilliwack, for example, receive about 60 inches per year. However, even at these places, summers are fairly dry. The average July rainfall at each is about 1½ inches. The drought problem is illustrated by the

9—6 A view over the Fraser delta at Mission City (British Columbia Government photo)





9—7 Climatic graph of Ladner, British Columbia

following comments in a statement issued in 1962 by the Dominion Experimental Farm at Agassiz, at the eastern, wettest end of the Lower Fraser Valley:

"An examination of the precipitation data for the growing months over the past eleven years indicates that summer drought was quite pronounced in five seasons. . . . On (this) basis . . . there appears little doubt that irrigation equipment is a necessary investment for dairymen and growers of cash crops."

Is there a summer drought problem like this in your neighborhood?

(c) Comment on winter precipitation at Ladner. About 17 inches of snow occurs each year, but it seldom remains on the ground for more than a few days.

(d) Study temperature conditions at Ladner, as shown in Figure 9—7. Compare the January temperature with that for the part of Canada in which you live. How does this temperature explain the fact that Mr. Swenson can leave his sugar beet crop in the ground over the winter months? Compare the July average temperature at Ladner with that for your home area. What is the annual range of temperature at Ladner? Compare it with that for Yarmouth (Figure 5—37) on Canada's Atlantic coast. How does the temperature at Ladner compare with that for Winnipeg? (see Figure 6—2)

(e) From your studies so far, list the chief characteristics of the climate of the Lower Mainland of British Columbia.

A major problem in the Lower Mainland is the disappearance of good farmland because of the spread of suburban housing and industry. Where else in Canada is this a serious problem? Its true seriousness in the Lower Mainland is indicated in a report of the local regional planning board, issued in 1962.[*] This report states that agriculture in the Fraser Valley creates one job in five in the Lower Mainland and meets half the region's food needs. But, at present rates, all farms could disappear from the Valley by 1980. This would be a serious matter because all food would then have to be brought in. As valley food prices are already among the highest in Canadian metropolitan areas and as British Columbia has less than one acre of cultivated land per person,

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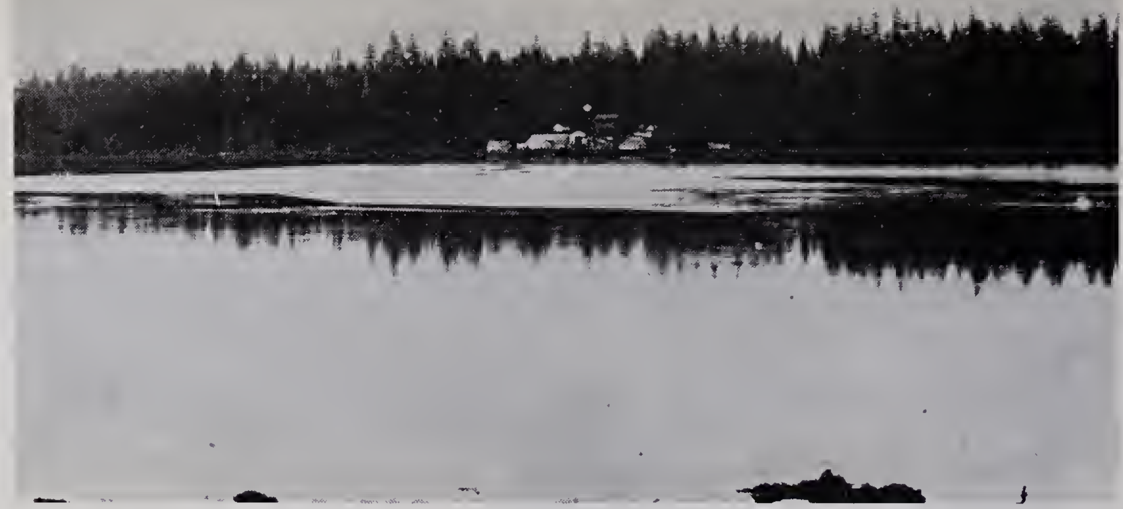
[*] Material referred to here was provided through the courtesy of the Lower Mainland Regional Planning Board, New Westminster, B.C.



9—8 View from Brockton Point towards present site of downtown Vancouver, 1884 (Vancouver City Archives photo)

the problem is an especially serious one. As in the Niagara Fruit Belt, the failure to restrict housing and industry to the poorer soils is the main difficulty. If reasonably good soils (which comprise only 40 percent of the total area) can be preserved for farming and if new settlement can be directed to the poorer soils, the Fraser delta can continue to meet half the food needs of a much larger population.

In 1961, there were about 9000 farms in the Lower Mainland. These comprised about 45 percent of all the farms in British Columbia. It should be noted that many of these were very small—less than 50 acres in size, which is much too small profitably to support the kind of mixed farming system used by Mr. Swenson.

Greater Vancouver – Canada's third metropolis

Many problems of the Lower Mainland relate to the rapid growth of Vancouver. This growth is dramatically shown by Figures 9-8 and 9-9.

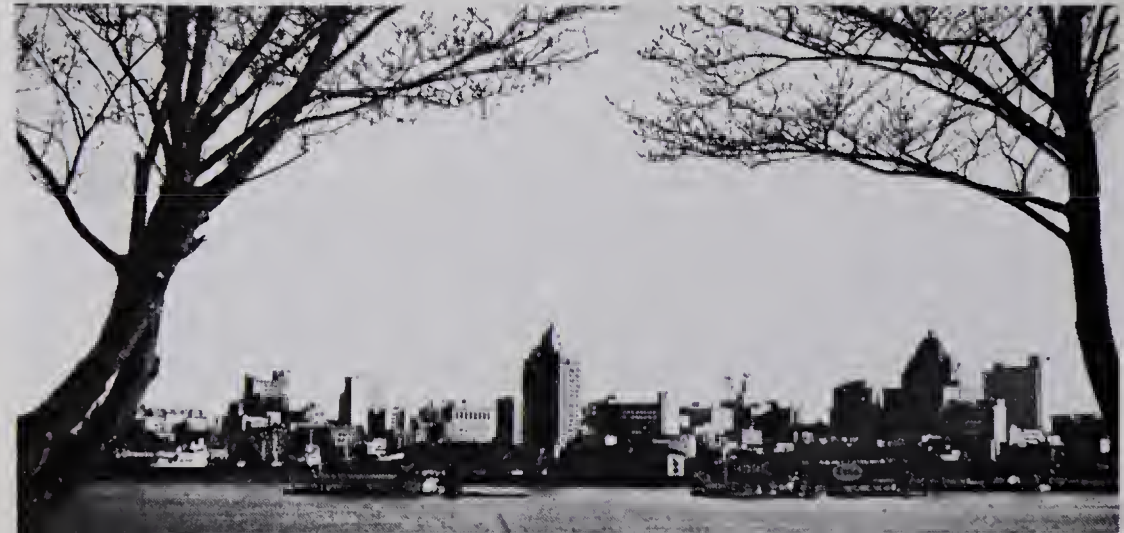
Two pictures and a map show Vancouver's growth in less than a century

1. (a) How many years apart were the two photographs taken?

(b) Locate Brockton Point (from which both photographs were taken) by reference to Figure 9—12.

(c) What was the advantage of the location of the tiny settlement shown in

9—9 Vancouver from Brockton Point in 1961, the 75th anniversary of the city's incorporation (Vancouver Sun photo)



the earlier photograph? Refer again to the map and name the body of water shown.

(d) Which famous natural resource of British Columbia is visible behind the small settlement?

(e) Describe the changes that have taken place in this landscape over a period of about 75 years.

2. Population figures for Vancouver also give proof of the city's tremendous growth:

1886	2,000
1961	384,000

If figures for surrounding municipalities are included, the total population in 1961 was nearly 800,000. This represents nearly half the population of British Columbia. Figure 9—10 shows how the bulk of the population of the Lower Mainland is centred in and around Vancouver. The boundaries show the municipalities. A municipality in British Columbia is not the same thing as a city. It is a local government unit that extends over a wide area and may include villages, towns, and cities.

(a) Locate the municipality of Mission on the map.

(b) What is the total population of the municipality (including Mission City)?

(c) How many municipalities are there in the Lower Mainland?

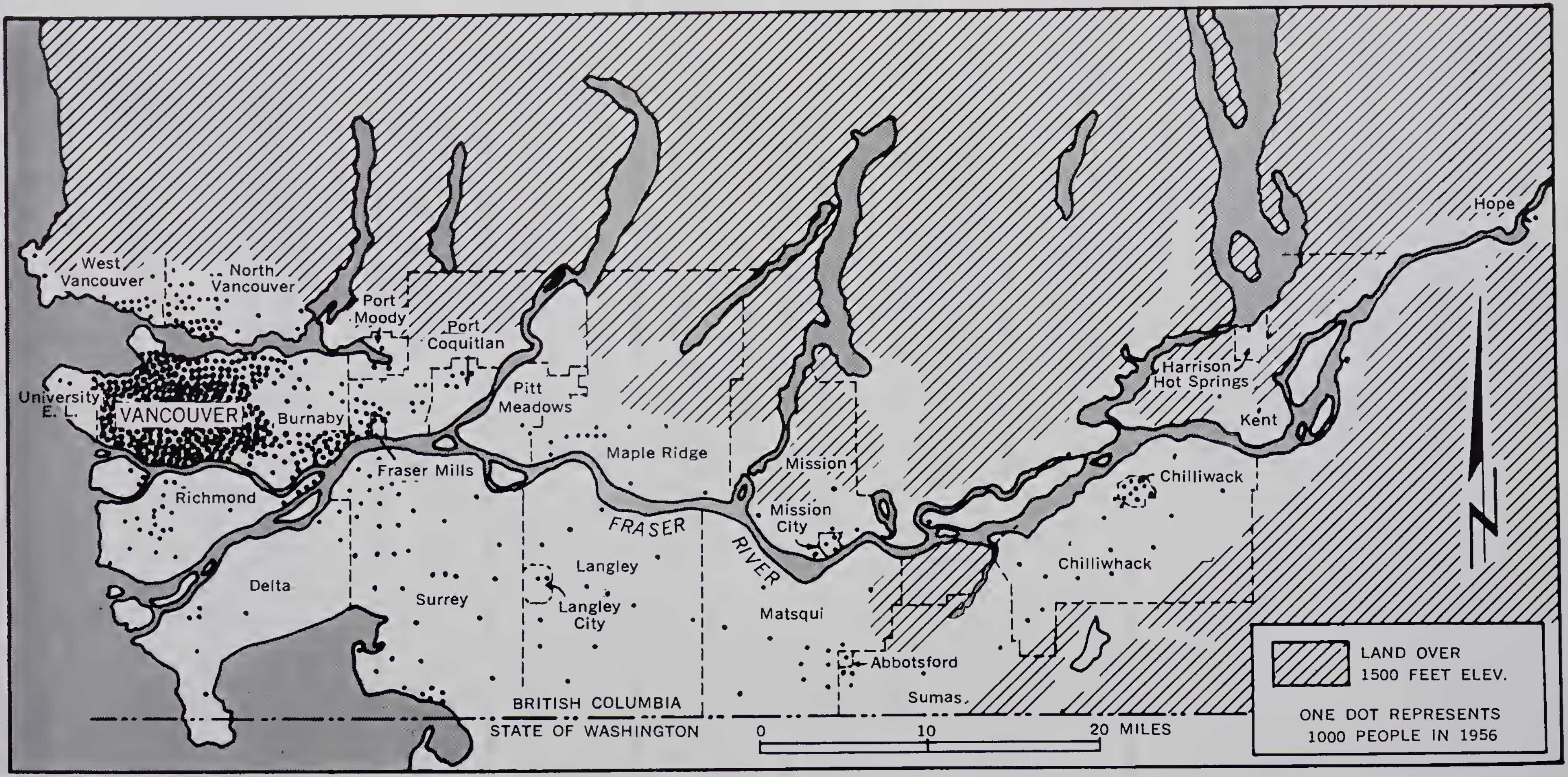
(d) Describe the relationship between the land below 1500 feet in elevation and population distribution.

We must now investigate why Vancouver has become, in 75 years, (a) Canada's second major port and (b) third largest city.

In the early days of settlement in the Lower Mainland, New Westminster was much more important than Vancouver. Locate this city in Figure 9-12. Describe its location. For a short time, New Westminster was the capital of British Columbia. It remains an important industrial city today and the chief port of the Fraser River. However, the completion of the Canadian Pacific Railway in 1885 led to the rapid growth of Vancouver. Refer to Figure 9-12 and locate the railway along the shoreline of the harbor. The line was not extended to its present terminus until 1887 but, on May 23rd of that year, the arrival of the first train from Montreal was one of the great events in the history of the city. Other important events in the history of the port were the following:

1891: First regular steamer services between Vancouver and Asia.
1909: First shipment of grain from Vancouver.
1914: Opening of the Panama Canal.
1917: Construction of the first grain elevator.
1921: First bulk shipments of grain (1,200,000 bushels).

Before considering the importance of the port of Vancouver today, let us study it by means of the topographic map and photographs.



9—10 The distribution of people in the Lower Mainland, 1956, showing also land above 1500 feet in elevation (after the Lower Mainland Regional Planning Board of British Columbia)

1. Figure 9—11 shows the downtown area of Vancouver in the foreground and part of the harbor in the background. This includes the oldest part of the city, but it is no longer mainly residential. Suggest some activities carried on in the large buildings shown.

2. Match the photograph with the map in Figure 9—12.[*]

(a) Which letters have been assigned to the following features in the photograph: Brockton Point; Stanley Park; Burrard Inlet; First Narrows Bridge; North Vancouver; West Vancouver; Coast Mountains?

(b) In which direction was the camera pointing when the photograph was taken?

(c) Notice the areas of suburban housing on the slopes of the North Shore. What factors may restrict the growth of North Vancouver and West Vancouver in the future?

(d) Two famous peaks, called The Lions, have been identified by the letter E in the photograph. How far are they from Brockton Point? What is their approximate elevation?

3. (a) How does the photograph suggest that Vancouver receives abundant rainfall? Actually, precipitation varies greatly throughout Greater Vancouver, as shown in Figure 9—13.

(b) All five places that receive more than 70 inches of precipitation are located on the North Shore. Which place receives the most precipitation? Compare this with the amount received in your neighborhood. The difference in precipitation between the Airport and Seymour Falls — two places less than 20 miles apart — is the greatest to be found in any metropolitan area of Canada. At Hollyburn Ridge, 3120 feet above sea level and less than ten miles from downtown Vancouver, 278 inches of snow was recorded during the winter of 1957-58. During the same winter, **no** snow was recorded at Vancouver City Hall.

(c) How much precipitation is received at the Airport? Where is the Airport in relation to the city?

(d) Locate Capilano Lake on the map. Is this a natural or an artificial lake? It is the main source of Greater Vancouver's water supply. Suggest why so much of the metropolitan water supply comes from the North Shore.

(e) It is evident that Vancouver has no true "average" rainfall. That at the city hall is often accepted as the standard figure. How much is recorded there?

(f) Here are the figures for bright sunshine hours at Vancouver:

J	F	M	A	M	J	Jl	A	S	O	N	D	Total
48	80	126	168	226	223	280	254	178	110	53	38	1784

Compare the total bright sunshine hours for the months of November, December, January, and February combined, with that for July. Suggest reasons why Vancouver gets so little sunshine during the winter months.

(g) The January average temperature at Vancouver is 37.6°F. Compare this with Ladner. How does this mild winter temperature suggest the major advantage that Vancouver has over Canada's other great seaport. Snowfall in an average winter totals 24.5 inches. Study Figure 9—14. This suggests the immense snowfalls that may occur on the nearby North Shore slopes. The photograph was taken at an elevation of nearly 4000 feet. Mild, spring-like conditions may exist on the streets of downtown Vancouver, while winter sports are in progress close by. How far is Mt. Seymour from downtown Vancouver, according to Figure 9—12?

(h) The July average temperature is 64.4°F. Precipitation for July averages 1.36 inches. Describe summer conditions in the city, judging from these figures.

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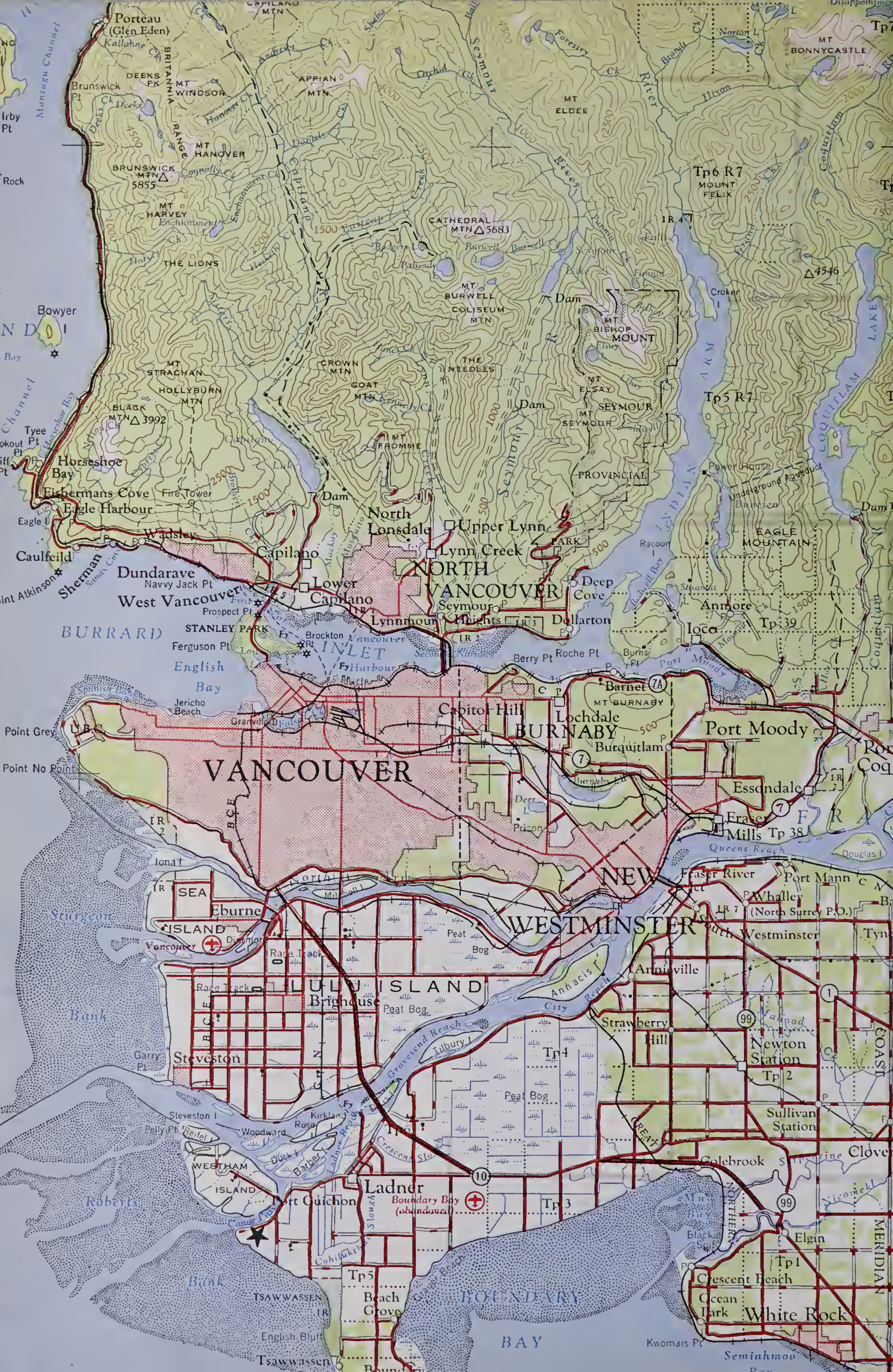
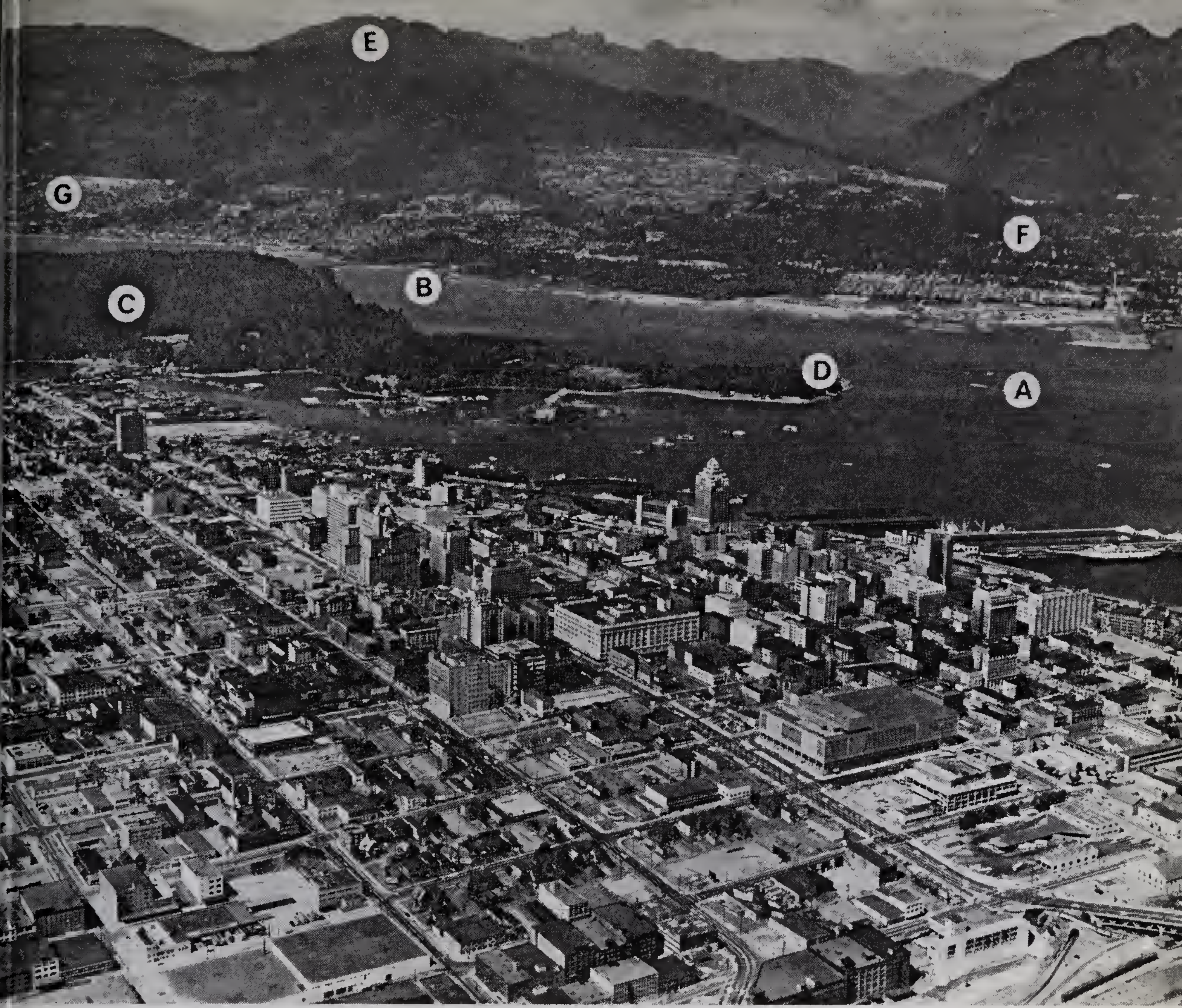
[*] This map is from Sheet 92G (1:250,000) of the National Topographic Series.

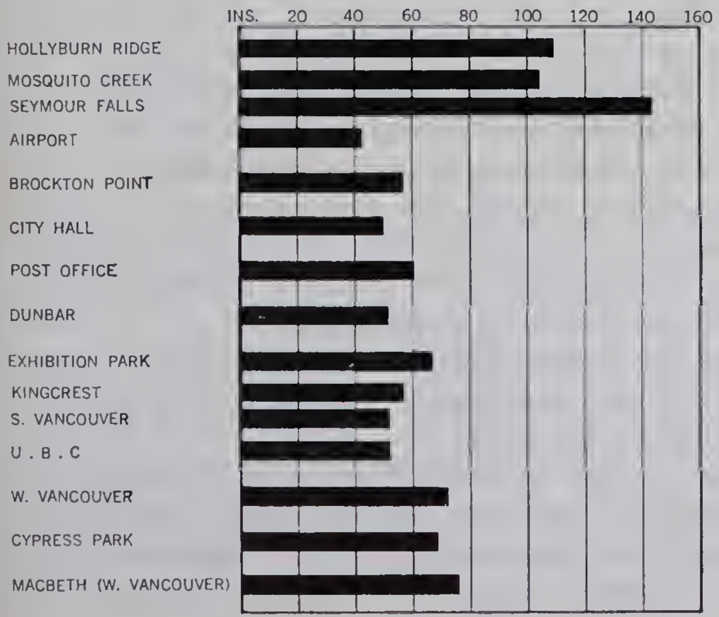


Porteau
(Glen Eden)
Kallahne Ck
BRITANNIA RANGE
CAPILANO MTN
Montagu Channel
Brunswick Pt
DEEKS PK
MT WINDSOR
Deeks L
Irby Pt
MT HANOVER
APPIAN MTN
Hanover Ck
Orchid Ck
Seymour Ck
Forestry Ck
Norton L
MT BONNYCASTLE
MT ELDEE
BRUNSWICK MTN 5855
Connolly Ck
Capilano R
Rock
MT HARVEY
Enchantment Ck
Enchantment Ck
Seymour River
Tp6 R7
MOUNT FELIX
Coquitlam R
CATHEDRAL MTN 5683
Rodgers L
Burwell L
THE LIONS
Haskell Ck
Palisade L
IR 4
4546
MT BURWELL
COLISEUM MTN
Dam
Croker
Bowyer I
Bay
MT BISHOP
MOUNT SEYMOUR
Elsay L
CROWN MTN
THE NEEDLES
GOAT MTN
Kennedy Ck
MT ELSAY
MT SEYMOUR
Tp5 R7
COQUITLAM LAKE
Channel
Horseshoe Bay
MT STRACHAN
HOLLYBURN MTN
BLACK MTN 3992
Nelson Ck
Cypress Ck
Capilano L
Dam
MT FROMME
Lynn Ck
PROVINCIAL PARK
INDIAN ARM
Power House
Underground Aqueduct
Buntzen L
Dam
Tyee Pt
Lookout Pt
Horseshoe Bay
Fishermans Cove
Fire Tower
Eagle Harbour
Eagle I
North Lonsdale
Upper Lynn
Lynn Creek
EAGLE MOUNTAIN
Racoon I
Caulfeild
Wadsley
Capilano
Dundarave
Navvy Jack Pt
Sherman
Sandy Cove
Point Atkinson
West Vancouver
Lower Capilano
NORTH VANCOUVER
Deep Cove
Bedwell Bay
Anmore
Prospect Pt
Seymour Heights
Lynnmour
IR 3
Dollarton
Ioco
Tp 39
IR 5
IR 1
IR 2
STANLEY PARK
BURRARD
Brockton Pt
First Narrows
Vancouver Harbour
Second Narrows
INLET
Ferguson Pt
Lost Lagoon
Fy
Berry Pt
Roche Pt
Burns Pt
Port Moody
English Bay
Spanish Bank
Jericho Beach
Barnet
7A
MT BURNABY
Capitol Hill
Lochdale
Point Grey
U.B.C.
Granville I
False Creek
BURNABY
Port Moody
Burquitlam
Port Coquitlam
Point No Point
VANCOUVER
7
Burnaby L
Essondale
Deer L
IR
BCE
Prison
Fraser Mills
Tp 38
FRASER
IR 2
Queens Reach
Douglas I
Iona I
North Arm
Mitchell I
NEW WESTMINSTER
Fraser River
Port Mann
IR
SEA ISLAND
Eburne
Whalley
(North Surrey P.O.)
IR 7
South Westminster
Sturgeon
Vancouver
Dinsmore
Peat Bog
Race Track
Race Track
LULU ISLAND
Annieville
Annacis I
City Reach
Brighouse
Peat Bog
1
Bank
BCE
Strawberry Hill
99
Newton Station
Tilbury I
Gravesend Reach
Tp 4
Tp 2
Garry Pt
Steveston
Peat Bog
COAST
Sullivan Station
Steveston I
Pelly Pt
Reifel I
Woodward
Rose
Kirkland
Ladner Reach
Deas I
Tp6
Duck I
Barber I
Crescent Slough
WESTHAM ISLAND
GREAT NORTHERN
10
Colebrook
Serpentine R
Cloverdale
Nicomekl R
ISLAND
Port Guichon
Ladner
Boundary Bay (abandoned)
Tp 3
Roberts
Canoe Pass
Slough
Mud Bay
99
Elgin
Cohilukthan Slough
Blackie Spit
MERIDIAN
Tp5
Tp1
Bank
Crescent Beach
TSAWWASSEN
IR
Beach Grove
BOUNDARY
Ocean Park
White Rock
English Bluff
BAY
Kwomais Pt
Semiahmoo
Tsawwassen
Boundary Bay



9—11 An oblique aerial view of downtown Vancouver and the adjacent North Shore area (National Film Board photo)

9—12 (opposite) The Greater Vancouver area on the scale of 1:250,000 from Sheet 92G of the National Topographic series



9—13 Variations in precipitation in Greater Vancouver

9—14 Skiing in Mount Seymour Provincial Park near Vancouver (British Columbia Government photo)

4. Figure 9—15 is an aerial view of Vancouver Harbor.

(a) In which direction was the camera pointing when the picture was taken?

(b) Notice that the harbor extends along both shores of Burrard Inlet. Locate the Second Narrows in the distance. Use the map to estimate the distance between the First and Second Narrows. Vancouver Harbor covers an area of nearly 50 square miles. With a minimum depth of 39 feet, for deep-sea vessels, it is one of the largest and finest harbors in the world.

(c) Locate False Creek on the map. Now locate it in the photograph. This is also part of Vancouver Harbor and is the centre of an industrial area where log rafts and barges can penetrate into the heart of the city. False Creek is a shallow former channel of the Fraser River. Locate the river in the distance, to the southeast in the photograph.

(d) Comment on the street pattern of Vancouver, as revealed in the photograph.

5. Railway and road transportation have been major factors in the growth of Vancouver.

(a) Try to locate railway installations in the photographs in Figures 9—11 and 9—15. Note the concentration of lines around False Creek on the map.

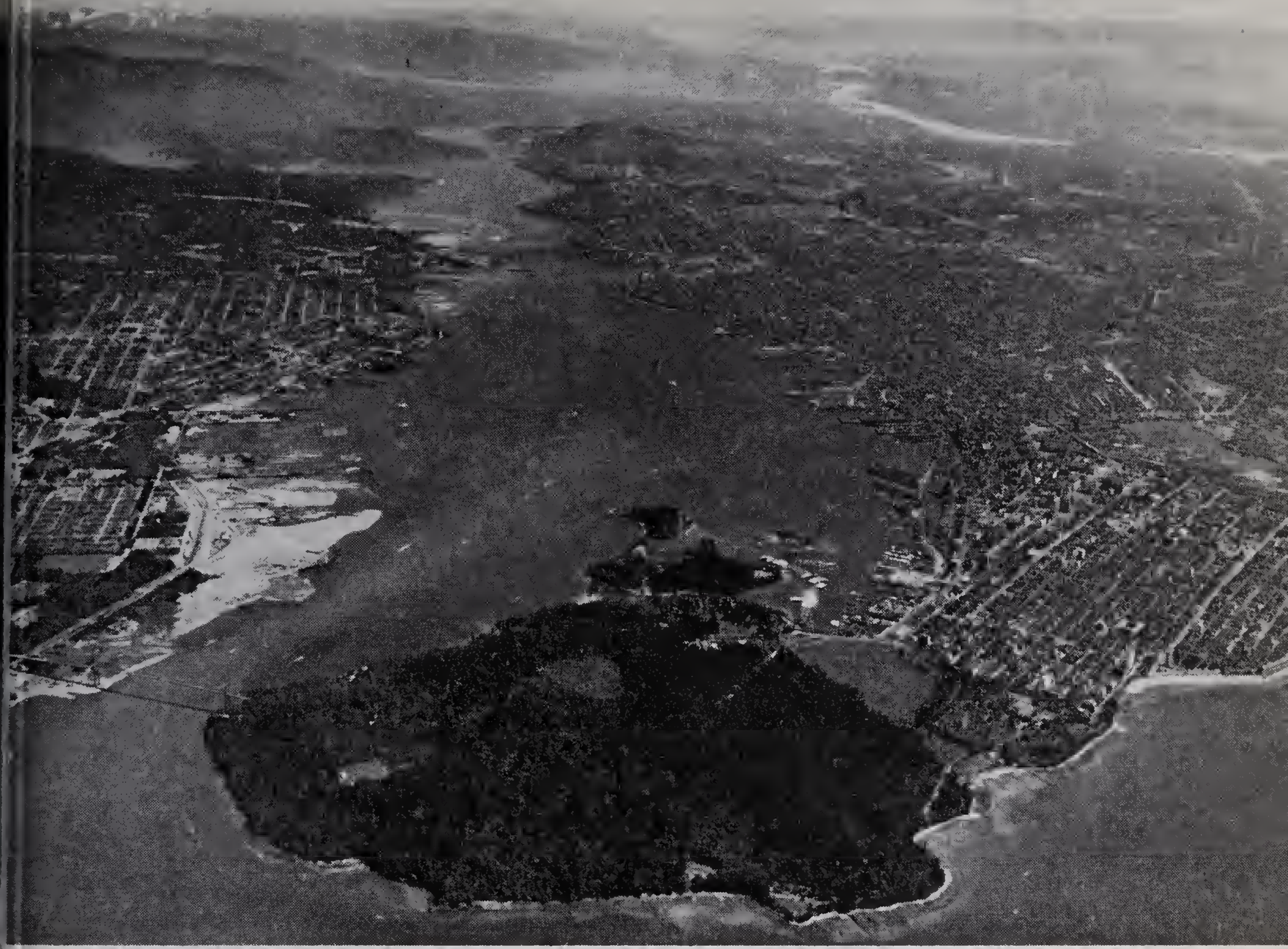
(b) By what route does the Canadian National Railway enter Vancouver?

(c) Trace the route of the Great Northern Railway on the map. This line connects Vancouver with Seattle and other points in the United States.

(d) The Pacific Great Eastern Railway extends from North Vancouver into the interior of the province. Trace its route on the map. Where is its northern terminus, according to Figure 9—61? Owned by the provincial government, this line is playing a major part in the opening up of the interior.

(e) By what route does the Trans-Canada Highway enter Vancouver? Trace Route 99 on the map. This is the main road leading from Vancouver to Seattle, San Francisco, and other United States points.

6. Find evidence of hydro-electric power development on the map, in the North Shore area. To the east of the city, other sites lie along lakes or rivers that drain into the Fraser. In what ways are conditions in this area especially favorable to water-power development? Figure 9—60 shows the location of a



9—15 Oblique aerial view of Vancouver Harbor (George Allen Aerial Photos Ltd.)

great power development in the Bridge River area, in the interior. This development meets a large share of Vancouver's power needs.

Figure 9-16 is a copy of the ship calendar that appears in the Vancouver newspapers each day. This calendar lists each vessel in port and indicates the country of origin, the cargo being loaded, and the destination. The names of the piers and wharves of Vancouver and New Westminster harbors are shown in black type. How many different countries of origin are represented? Name four cargoes that were being loaded for shipment on November 7, 1962. General cargo includes a great variety of small goods other than lumber or grain, which are usually classified as bulk cargoes. With which continents does Vancouver trade, according to this calendar? Where a destination is stated as simply "Continent," Europe is meant. Where a ship will be calling at several ports in more than one country, only the continent or general area (such as "South Seas") is indicated. List six different nations to which cargoes were being prepared for shipment on November 7, 1962. What does the calendar suggest as the largest export of New Westminster?

SHIP CALENDAR

VANCOUVER HARBOR

Arrival: Hadjitsakos.

Departures: General Lim, Bartenstein, Shigaharu, Maru, Bernes, Hendrik Fisser, Dona Marguerita, Argentinian Reefer, Orinoco, Oceanic, Nippoh Maru.

ANCHORAGE–			
Hadjitsakos (Gk.)	Dingwall Cotts	Pakistan-India	General
Enyo Maru (Jap.)	Empire	Japan	Coal
BALLANTYNE–			
Dongedyk (Dutch)	Royal Mail	U.K.-Cont.	Gen. Lbr.
B.C. SUGAR–			
Silverisle (Br.)	Dingwall Cotts	Orient	Discharge
BURRARD DRYDOCK–			
Thor I (Nor.)	Empire	South Seas	Discharge
Granville (Nor.)	Dingwall Cotts	South America	Grain
CPR A-1–			
W. R. Lundgren (Swed.)	Empire	Aust.	Lumber, General
CPR PIER B–			
Philippine Mail (Am.)	Can. Blue Star	Orient	General, Lumber
CENTENNIAL–			
Vaava Leader (Fin.)	Pacific Coast	Cont.	Lbr., Gen., Grn.
EVANS, COLEMAN AND EVANS–			
Sunpalermo (Ital.)	Saguenay Shipping	U.K.	Pulp
LAPOINTE–			
Hollands Duin (Dutch)	North Pacific	China	Grain
Italterre (Ital.)	Vanport Shipping	Mediterranean	Pulp
Santa Ana (Am.)	Seaboard	South America	Lumber
PIER B –			
Japan Mail (Am.)	Can. Blue Star	Orient	General
TERMINAL–			
Mormacdawn (Am.)	Balfour Guthrie	South America	General
Nissei Maru (Jap.)	Kingsley Nav.	Orient	General
VANCOUVER WHARF–			
Schwanheim (Ger.)	Anglo-Canadian	U.K.	Lumber

NEW WESTMINSTER HARBOR

Arrivals: Anitsa L., General Lim, Bernes.

Departures: California Star, Silverfell, Carl Fritzen, Buffalo, Hadjitsakos.

OVERSEAS–			
Karpfanger (Ger.)	Dingwall Cotts	Continent	Lumber
Bernes (Nor.)	Seaboard	U.K.-Continent	Lumber
Loida (Gk.)	Seaboard	U.K.-Continent	Lumber
PACIFIC COAST–			
Bonita (Swed.)	Anglo-Canadian	U.K.	Lumber
Kyoko Maru (Jap.)	Empire	Orient	----
Anitsa L. (Gk.)	Anglo-Canadian	----	----
General Lim (Phil.)	Empire	Orient	General, Lumber

9—16 The ship calendar of Vancouver Harbor for Sunday, November 7, 1962.

The *Canada Year Book* recorded the following cargoes as the main ones handled by Vancouver in 1959 (in order of tonnage):

Imports	Exports
Sand, gravel, and stone	Wheat
Logs, posts, poles, etc.	Pulpwood and chips
Newsprint	Petroleum products
Cement	Barley
Iron and steel bars	Lumber, timber, boxes
Sugar (raw and refined)	Flour, grain
Salt	Flaxseed
	Gasoline

Vancouver is now Canada's leading grain port, having surpassed Montreal as a result of huge wheat contracts with China and Japan. On page 300 in Chapter 7, a grain shipment was traced from the Regina Plains to Japan, via Vancouver. Which other export products probably come from the Prairies? Review Figure 8-24 and note the route followed by oil pipelines to Vancouver, which is one of Canada's main refining areas. Petroleum and petroleum products are shipped to coastal points, to Vancouver Island, and to nearby United States centres. Which products probably originate from coastal and Vancouver Island points? Sand, gravel, and stone, the largest imports in terms of tonnage, are brought in mainly by barge from the rugged Coast Mountains to the north. Large quantities of building materials are thus easily available to the city.

Which products probably originate in overseas ports? To handle the goods named in the list, Vancouver Harbor requires extensive facilities. There are 110 berths, including 58 for deep-sea vessels. This deep-sea berthing comprises six miles of piers and wharves to service the 66 steamship lines that maintain regular services from Vancouver to the Atlantic coast of North America and all the other continents. Seven grain elevators have a total capacity of nearly 22,000,000 bushels and the most modern handling facilities are used. All railways shown in Figure 9-12 serve the port. Two floating drydocks offer excellent ship repair facilities and Vancouver is the leading shipbuilding centre on Canada's Pacific coast. Much of the trade is coastal and a huge fleet of tugs and barges is based in Vancouver. Ferry services to coastal points and to Vancouver Island handle 1,500,000 passengers per year, the largest passenger business of any Canadian port, although Montreal handles more overseas passengers.

Most of Vancouver's manufacturing industries are based on imported raw materials. Oil refining is a good example. The metropolitan region also contains the greatest concentration of sawmills in Canada. About 40 percent of all Canadian sawn lumber is produced in British Columbia, the bulk of it in Greater Vancouver, where the largest mills are concentrated on the Fraser River shore around New Westminster.

List some other industries that you would expect to find at Vancouver, judging from the list of imports and exports. Many people are employed in food processing for the large metropolitan market. Suggest some processing industries based on local agricultural produce. Figure 9-17 shows part of the Vancouver fishing fleet. Most of British Columbia's canneries are located in the metropolitan region. Locate Steveston in Figure 9-12. A large fishing fleet is based on this port and several canneries are located there. For which canned-fish export is British Columbia world famous?

A large proportion of Vancouver's industries are primary—that is, like sawmilling and canning, they are based on fairly simple "one stage" processing of bulk raw materials. More than one third of the city's workers are employed in this type of manufacturing. The corresponding

9—17 Part of the fishing fleet, Vancouver Harbor (National Film Board photo)

figure for Toronto is less than ten percent. However, more secondary industry is developing and recent new industries include a steel-pipe mill, a copper mill, a wire and cable plant, and several chemical plants. As one of Canada's greatest transportation centres, Vancouver employs thousands of workers in jobs related to the railway, trucking, and shipping industries.

No Canadian city is blessed with such a variety of recreational facilities close by. Make a list of these facilities, as indicated by Figure 9-12. A pleasant summer climate and many cultural attractions are other factors drawing thousands of visitors every year.

Reviewing Metropolitan Vancouver (Further study of Figure 9—12)

1. (a) Locate the University of British Columbia on the map. In which direction from Vancouver does it lie? It is one of Canada's largest universities.

(b) Where does Burnaby lie in relation to Vancouver? With a population exceeding 100,000, it is the second centre of the metropolitan region.

(c) Why is New Westminster important? This city has a population of nearly 35,000.

(d) North Vancouver is mainly residential, but has a large industrial zone. Where are the industries of this city concentrated? West Vancouver is a residential community.

2. A striking feature of the map is the contrast between the northern and southern halves.

(a) Name some characteristics of the Fraser River as revealed in the southern half of the map area. Where does it divide into two channels or arms?

(b) What reasons does the map suggest for believing that the delta area to the south and east of Vancouver is low-lying and flat? Compare the density of settlement with that of the area north of North Vancouver.

(c) List some major features of the Coast Mountain area in the North Shore district.

(d) Which natural resources of the metropolitan region are revealed by this map?

3. What is your answer to the major question posed on page 379?

4. (a) Which features make the Lower Mainland a distinct region?

(b) In what important ways does the Lower Mainland Region resemble or differ from your home region?

(c) Identify some problems relating to planning and conservation that the people of the Lower Mainland must face.

THE COAST MOUNTAINS—VANCOUVER'S BACKYARD

This region rises abruptly from the Lower Mainland to the south. Northwards it extends more than 500 miles, as far as Alaska. Look at the portion shown in the northern half of Figure 9-12. What do you notice about the relief, drainage, vegetation, transportation, and settlement patterns? What are the assets of the region? What are the chief problems? This huge area contains fewer people than live in the capital city of Victoria and difficulty of communication with the rest of British Columbia is one of its greatest problems. The coast of British Columbia is greatly indented, as we saw in Figure 9-2. This fact, and the great barrier of the Coast Mountains, which have been called "a solid wall of granite," make land transportation nearly impossible over most of the region, especially in winter. What do you notice about the automobile route from Vancouver to Prince Rupert on an atlas or road map? This city is about 500 miles from Vancouver by steamer. How many miles is it by road?

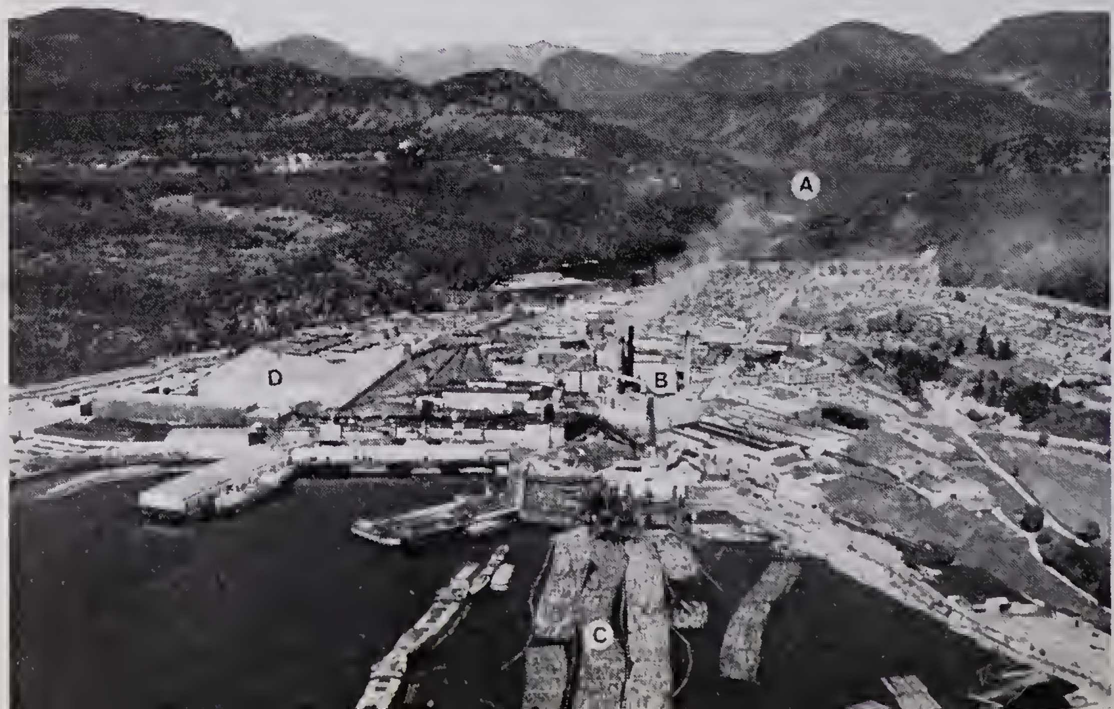
Two major settlements on the coast are Ocean Falls and Powell River, both important pulp and paper-making centres. The forested slopes of the Coast Mountains (as shown in Figure 9-18) supply plenty of wood. The photograph shows that Ocean Falls is also an important fishing port. Log booms may be seen in the far distance, but the large mill in this town is not visible. Why would you expect to find little agriculture in the Coast Mountains Region? What were the difficulties of locating a settlement there? Compare the location of this settlement with that at Portugal Cove, Newfoundland, shown in Figure 5-5. Describe the main similarities and differences between environments and occupations at these two places. Why is hydro-electric power plentiful in the Coast Mountains region? One disadvantage is that most of the rivers are short and flow in narrow valleys. Natural storage basins of the type found in the Canadian Shield are lacking. Figure 9-19 is an oblique aerial view of Powell River, a typical coastal town of British Columbia. Locate Powell River in Figure 9-2. Which letters identify each of the following features: log booms; a fjord; the pulp and paper mill; piles of sulphur? Locate some barges loaded with chips for the mill. Note the vessels waiting to load the products of the mill. Describe

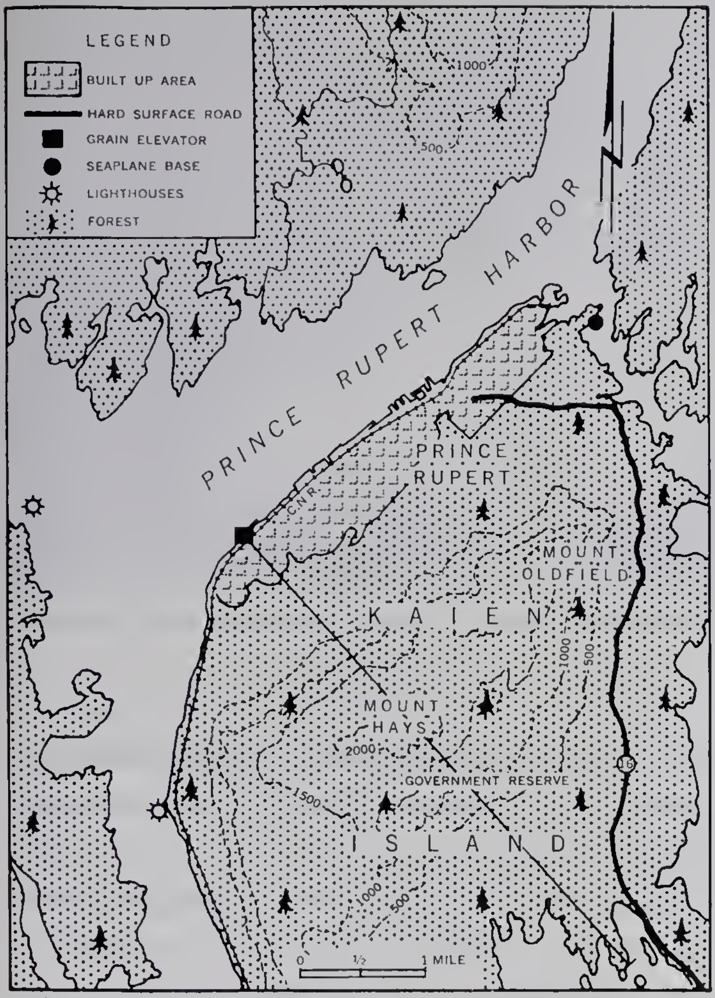
9—18 A view of part of Ocean Falls on the coast of British Columbia (Canadian National Railways photo)

the general site of the town. What are the advantages of this site for a settlement of this type?

Prince Rupert, with a population of about 12,000, is the chief port and industrial centre of the Coast Mountains. Which transcontinental railway line terminates there? Located near the mouth of the Skeena River on an island with a deep natural harbor, Prince Rupert has never grown as rapidly as was hoped when the city was founded in 1910. However, with one third of the population of the Coast Mountains Region, Prince Rupert is an important port and fishing centre and the focal point of several forest industries.

9—19 An aerial view of Powell River (Val Hennell photo)

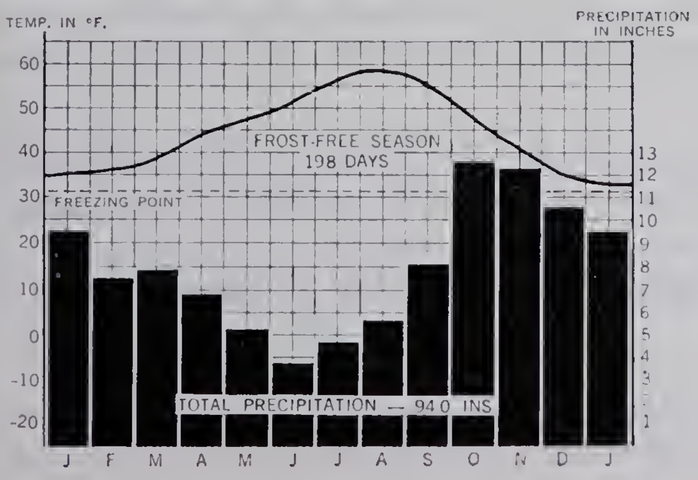




9—20 A large-scale map of Prince Rupert and its neighborhood

The Prince Rupert district

1. Figure 9—20 is a map of Prince Rupert.
(a) Describe the shape of the settlement.
(b) Describe the route of the railway into Prince Rupert. What were some of the problems faced by the engineers in building this railway?
(c) What evidence is there that Prince Rupert exports grain? How does a shipment of wheat from Alberta reach the port?
(d) Estimate what proportion of the land area shown is forest covered.
(e) Draw a section along the line indicated. Comment on the relief of the island and suggest reasons for the position and shape of the city.
2. Refer to Figure 9—21.



9—21 Climatic graph of Prince Rupert

(a) Compare the January average temperature with that for Ladner, 500 miles to the south. Warm, moist Pacific air provides mild winter temperatures at Prince Rupert, while eastern Canadian cities such as Ottawa, 800 miles closer to the equator, are often enduring sub-zero temperatures.
(b) In the Coast Mountains Region itself, conditions are as cold as this away from the sea. At Kemano, 50 miles inland from Kitimat, the January average temperature is only 15°F. Why do temperatures drop so suddenly a short distance from the coast?
(c) Does Prince Rupert Harbor close during the winter months?
(d) Compare summer conditions at Prince Rupert with those at Vancouver.
(e) What is the total annual precipitation at Prince Rupert? This city illustrates winter precipitation conditions on the mainland coast and on the west coast of Vancouver Island. How do they compare with conditions along the south coast, south of the Coast Mountains? Compare the total precipitation for the three wettest months at Prince Rupert with the **annual** total for Ladner (Figure 9—7). In which season does the maximum precipitation occur at Prince Rupert? The city receives only 32 inches of snow in an average winter—further indication of the mild conditions at this latitude.

The manufacture of cellulose wood pulp is an important industry at Port Edward, a few miles from Prince Rupert. Plastics and fibres are among the materials made from the pulp.

Prince Rupert ranks next to Greater Vancouver as the largest centre of the fishing industry in British Columbia. Known as "The Halibut Capital of the World," the port handles up to 18,000,000 pounds a year. Carloads of fresh halibut are sent by rail to eastern Canadian and American cities.

The salmon is the most valuable catch. The five species taken include sockeye, pink, coho, chum, and spring. The fishermen make their great catches in the summer and autumn when the adult salmon return to spawn in the rivers where they were born. Here is a description of the salmon run:*

> When the fish come in from the open sea . . . they are active and beautiful. . . . All are possessed by that remorseless urge for perpetuation which entails destruction. . . . They have to fight their way up rivers, bruise themselves in shallows or in leaping up rocky falls, being attacked by bears and pecked at by gulls and eagles. . . . The whole surface of a river boils as myriads of fish swarm to destruction. They swim against swift currents, thrash through rapids, and leap up falls.
>
> Emaciated, misshapen, fins worn, tails shredded, the salmon reach the spawning pools at last. The weary mothers scrape out hollows, pushing down with lowered heads, whipping the water with their tails until the whole surface is splashed and broken.
>
> In a short time, the fry are hatched. They travel to the ocean and begin a new cycle.

*This quotation is from *Three's a Crew* by Kathrene Pinkerton, published by Grosset and Dunlap, New York, 1940, and included here with kind permission.

9—22 A purse seiner emptying its catch (National Film Board photo)

Fishing methods include gill-netting, purse-seining, and other methods illustrated in Chapter 5. Pages 203-208 in that chapter should be reviewed. The largest runs in the past have occurred on the Fraser. The salmon-fishing fleets based on that river are the largest in British Columbia. Figure 9-22 shows a purse seiner near Prince Rupert emptying its catch into a cannery fish barge. The salmon are immediately iced to keep them fresh for processing.

Figure 9-18 shows a type of vessel, used on the Pacific coast, that is seldom seen on the Atlantic coast. The boats with the tall upright poles on each side are trollers. These are used for fishing for coho and spring salmon, the only salmon that will take a bait. Trolling may be described as a hook-and-line method and is entirely different from trawling. Lines are fastened to the long poles. The poles are lowered by ropes running through pulley blocks until they are sticking out nearly horizontal. There are usually two lines attached to each pole, with a spoon bait attached to each line. Here is a description of landing the catch:*

> A line two miles long was being hauled in by a gurdy and on every few yards of it was a fish. Cod, gorgeous big red snappers and halibut up to sixty pounds came over the side in an endless procession to flop on the deck.

Salmon are by far the most valuable fish caught in Canada. In 1959, British Columbia accounted for one third of the value of all fish sold in the country and salmon was mainly responsible for this fact. Most salmon are canned, although considerable quantities are also marketed as fresh and frozen fish.

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*This quotation is from *Three's a Crew* by Kathrene Pinkerton, published by Grosset and Dunlap, New York, 1940, and included here with kind permission.

Fishing is a difficult and dangerous occupation, requiring a great deal of expensive equipment. A fully-equipped seiner costs approximately 90,000 dollars; a salmon net costs between 5000 and 7000 dollars, and a herring net may cost up to 15,000 dollars. When the runs are good, fishing can be very profitable. In July, 1962, for example, it was reported that purse seiners off Prince Rupert were hauling in 1,000,000 fish *per day,* the largest pink salmon run in British Columbia history. The catch had to be limited because the packers and canneries could not handle more. Every packer available hauled the fish to canneries in Prince Rupert and Vancouver. There are seven canneries in the Prince Rupert area, capable of producing half a million cases (at 48 cans to a case). Greater Vancouver, with 36 canneries, is the largest fish-processing centre in Canada.

Runs such as that described above are not common. Serious conservation problems have developed in the industry. Sometimes streams dry up, causing eggs to rot. In other cases, sudden "flash floods" may wash the fry to destruction. Removal of trees from the slopes of tributary streams may cause stream flow to vary, water temperatures to change, and general conditions to arise that are unfavorable to the spawning of salmon. Often the fish perish as they are sidetracked into irrigation channels.

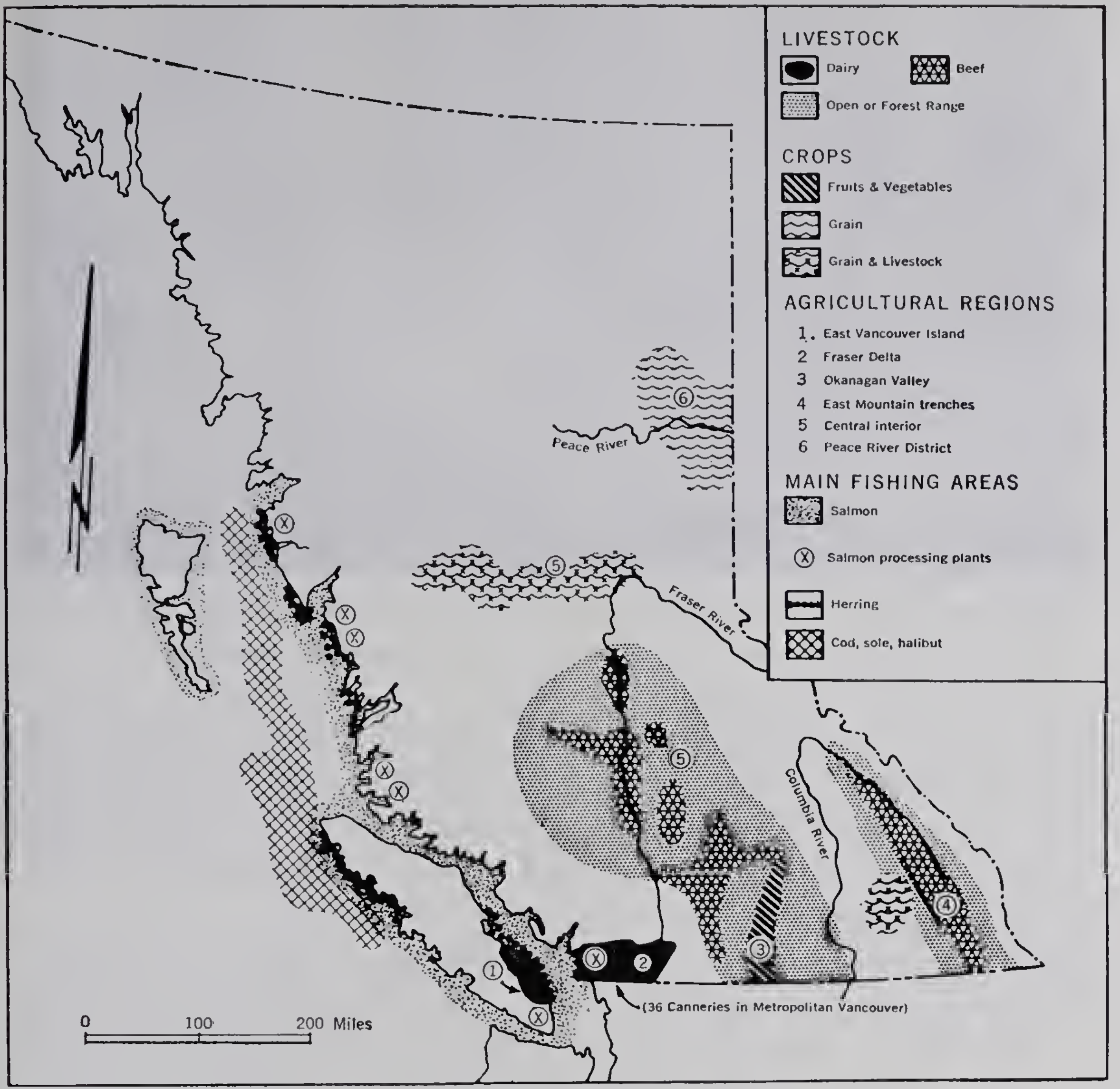
Fish must be regarded as a crop, to be developed and harvested in such a way as to provide the best possible return without endangering future production. Among the conservation measures being taken on the Pacific coast are the following:

---

1. Fish below a certain minimum size may not be taken.
2. Closed seasons are maintained during the spawning season, so that sufficient fish are permitted to reach the spawning grounds and assure a future supply.
3. Regulations prohibit the discharge into streams of any materials injurious to fish life.
4. Inlets to irrigation ditches must be screened, by law.
5. "Fishways" may be built around waterfalls and other obstructions.

Figure 9-40 shows a fishway at Hell's Gate, on the Fraser River. The salmon are able to swim up this protected passage, and so bypass the rapids.

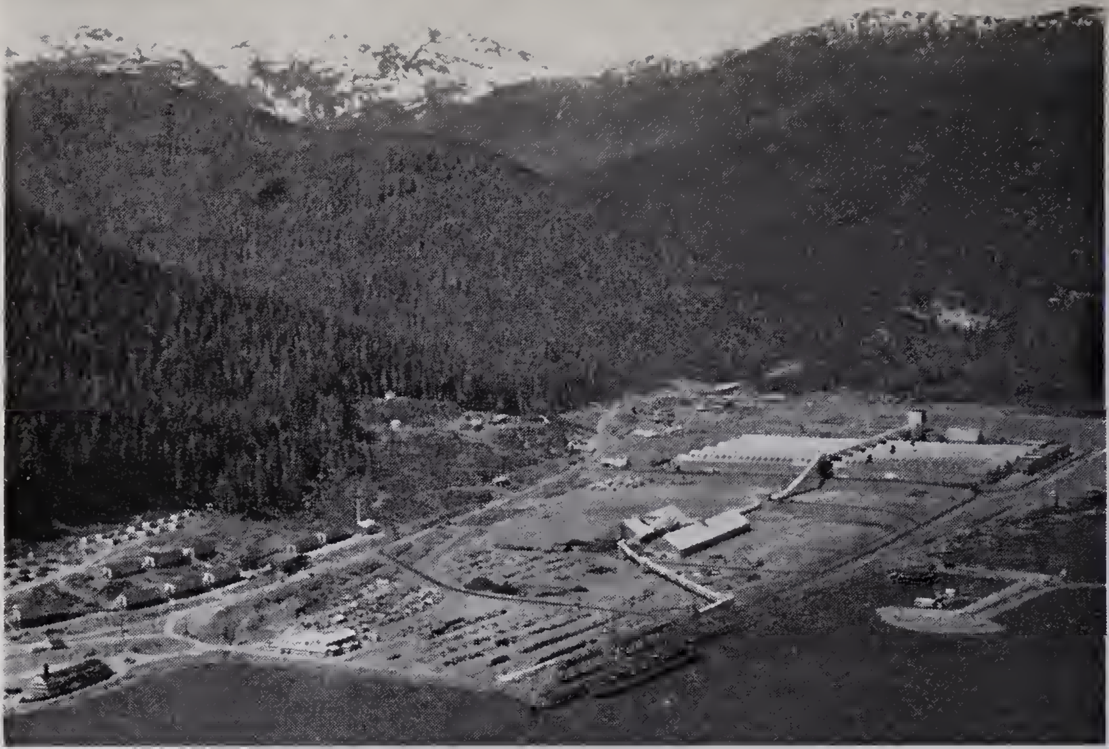
The building of power dams on streams has created new problems. Sometimes fishways have been used successfully. However, it is recognized that the building of high dams on major rivers such as the Fraser would greatly reduce, or destroy, the salmon runs.



9—23 Farming and fishing in British Columbia

Study Figure 9-23 which shows a map of the main British Columbia fisheries. Which species of fish are caught besides those already mentioned? Note that all these species are found near Prince Rupert. Altogether, 5000 people including fishermen, plant and canning workers, packing boat crews and office personnel, are employed in the fishing industries of the city.

The Kitimat aluminum smelter is another important industrial development not far from Prince Rupert. The smelter uses power from the largest hydro-electric installation in British Columbia, at Kemano, nearly 50 miles away. Kitimat is at the head of Douglas Channel, a large fjord. As recently as 1951, the townsite was a wilderness. Today, it has more than 10,000 people and has been called the best planned and most modern town in North America. Review the account of the Arvida aluminum development in Chapter 4. The same factors that favored an aluminum enterprise there many years ago have operated to establish the Kitimat development today. Bauxite is imported from

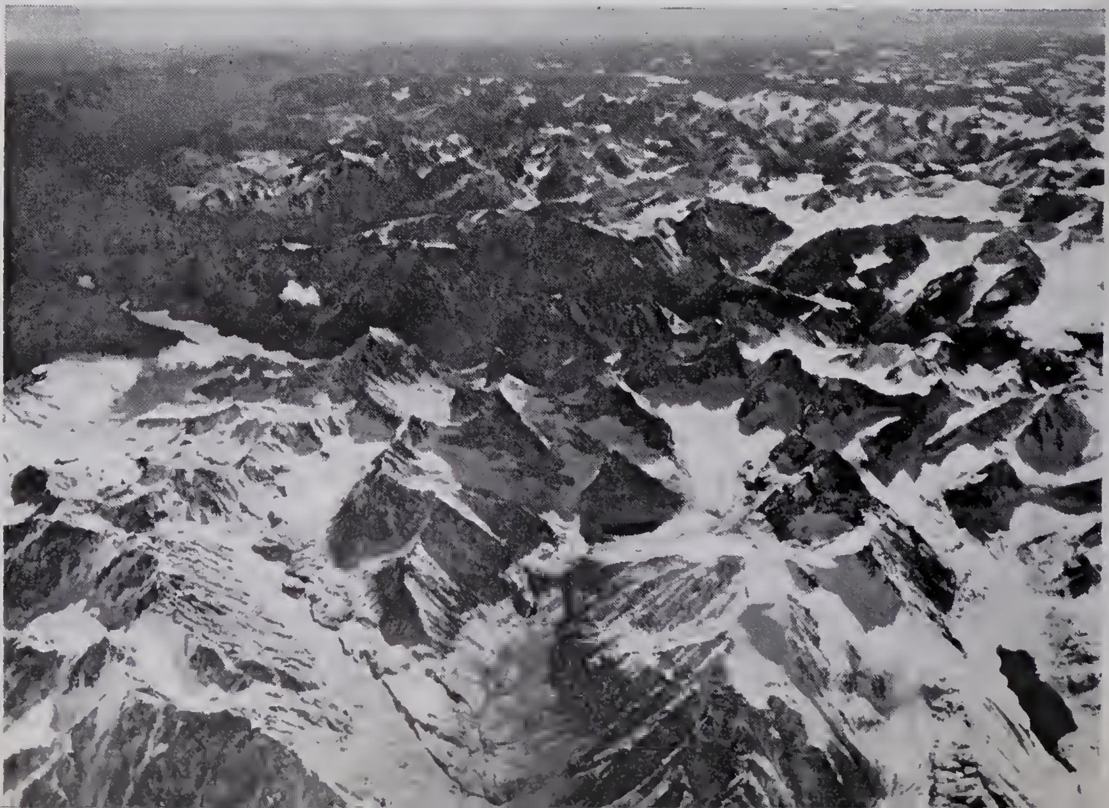


9—24 An aerial view of the Kitimat smelter and dock area. The town is located off to the left of the photograph. (Aluminum Company of Canada photo)

British Guiana and Jamaica. By which route would the ore be transported to Kitimat? Study Figure 9-24. Locate Kitimat in Figure 9-2. Give reasons why this place was selected as the site of an aluminum industry. A large pulp and paper mill is being considered there. Why would this be a suitable site for such a development?

North of Prince Rupert, the Coast Mountains Region extends as a huge wilderness to the borders of the Yukon and Alaska. Part of the area is shown in Figure 9-25. This landscape has been called "a sea of mountains." Why is this a good term? List some evidence of the work of glaciers shown in this photograph.

9—25 The "sea of mountains" on the northwestern coast of British Columbia (R.C.A.F. photo)



Why is there very little agriculture in the Coast Mountains Region? Gardens and a few small farms are maintained around each settlement. Some farmlands have been developed to the east of Prince Rupert.

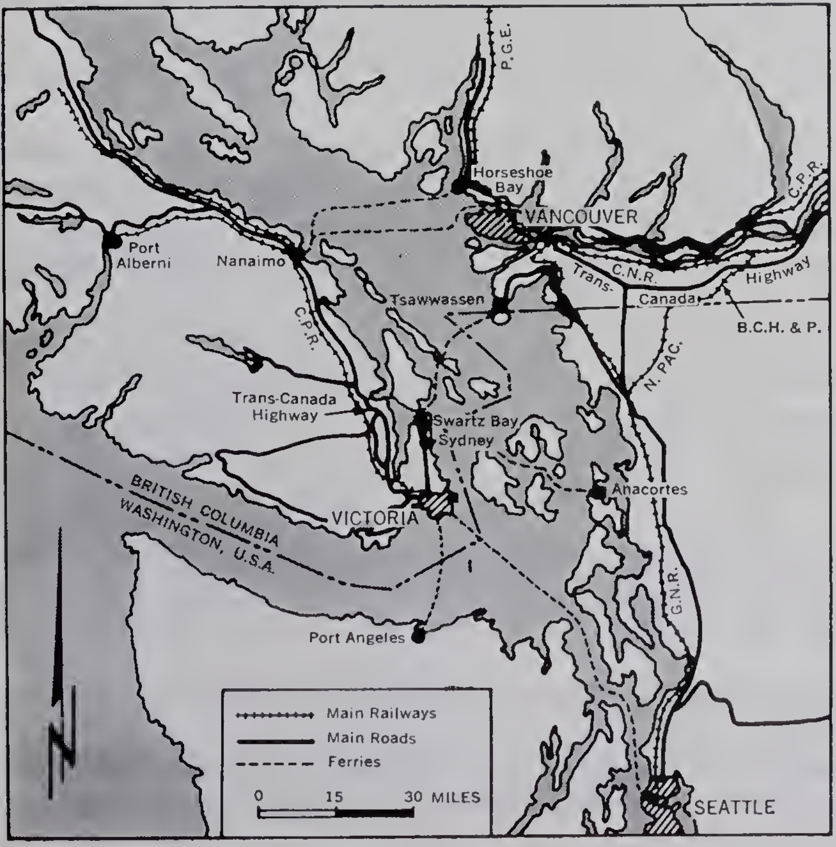
Reviewing the Coast Mountains Region

1. List the factors that make the Coast Mountains a distinct region. In what important ways does it differ from the Lower Mainland Region?
2. In what ways has the Coast Mountains Region contributed to the growth and wealth of Vancouver?

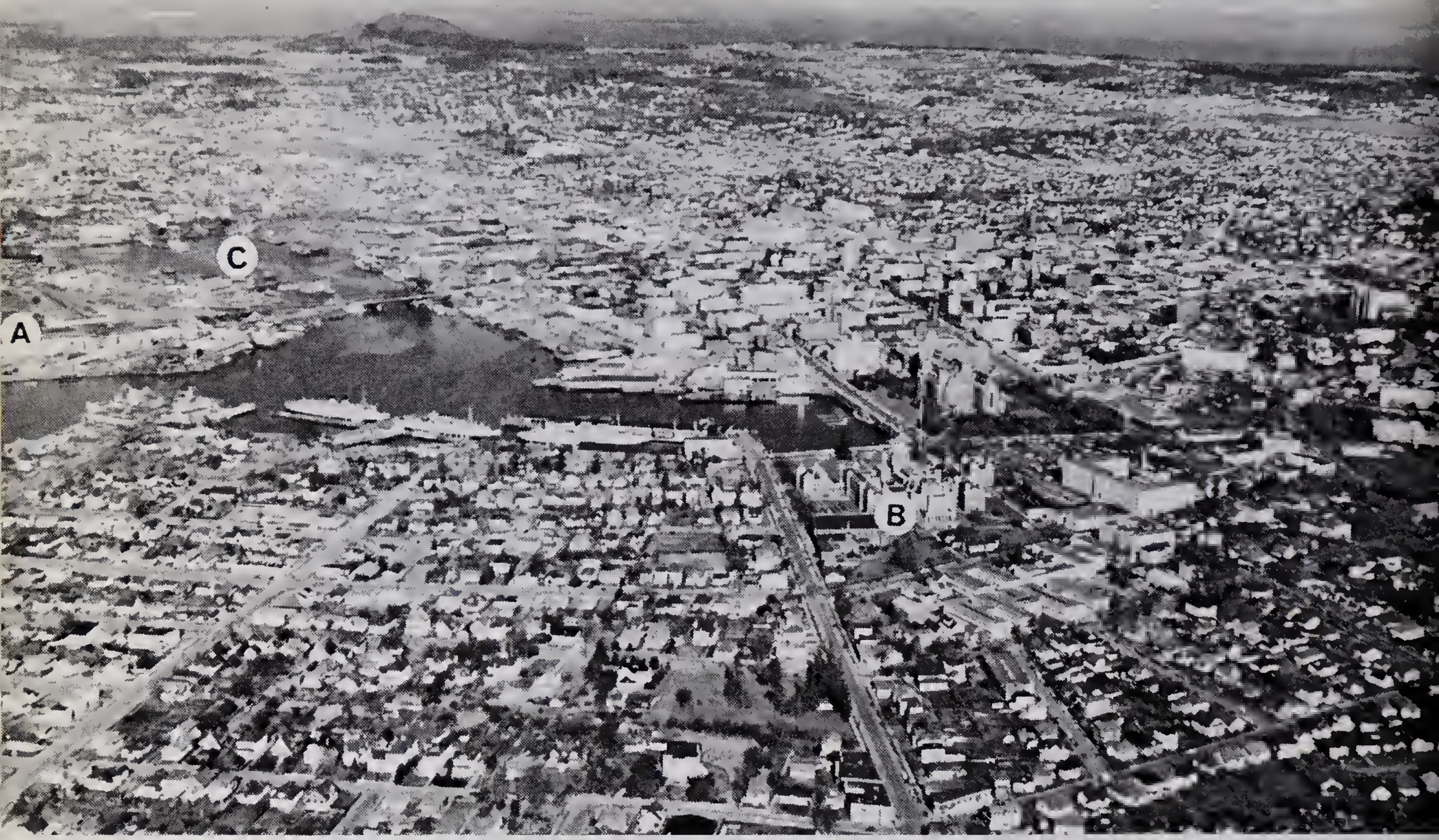
VANCOUVER ISLAND

Vancouver Island, one of the largest islands in the world, covers an area of 13,000 square miles. In 1961, its population of more than 250,000 persons, comprised about 17 percent of that of British Columbia. The island may be divided into two distinct regions: the coastal plain along the eastern shore, and the mountainous west. The coastal plain varies in width from one to ten miles. It has much in common with the Lower Mainland and may be considered as an extension of the latter, connected with, rather than separated from it, by the waters of the Gulf of Georgia. Greater Victoria occupies the southeastern tip of this lowland and has about half the population of Vancouver Island.

Victoria was founded as a Hudson's Bay Company post in 1843. For many years, it served as the sea gateway and the main port of British Columbia. In 1868, it replaced New Westminster as the capital of the province. Its links with the mainland, especially with Vancouver, remain vital. These are illustrated by Figure 9-26.



9—26 Victoria's links with the mainland of North America



9—27 An oblique aerial view of Victoria (British Columbia Government photo)

What factors make Victoria the chief city of Vancouver Island and the second largest city of British Columbia?

1. (a) In which direction from Vancouver does Victoria lie?

(b) Describe the various combined land and water links between Victoria and Vancouver. What is the distance between the downtown areas of the cities by the shortest of these routes? Frequent air services also operate between them. With what other places does Victoria have ferry connections?

2. Figures 9—27 and 9—28 comprise a photograph and a large-scale map of Victoria.

(a) In which direction was the camera pointing when the picture was taken?

(b) Which letters on the photograph identify the following features that are named on the map: Parliament Buildings; Upper Harbor; oil storage tanks?

(c) List some industries and functions of Victoria revealed by the photograph and map.

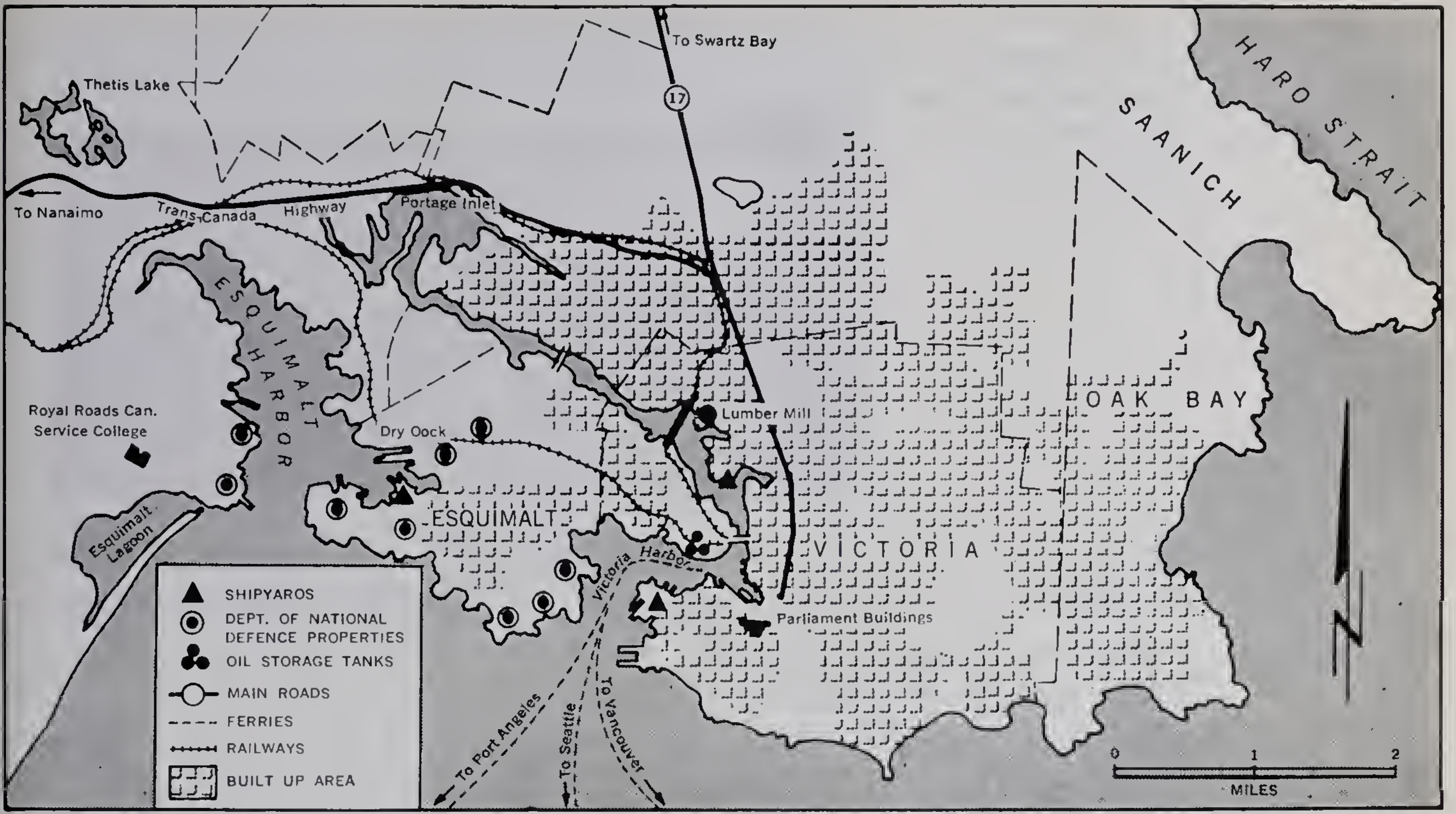
(d) Locate Mount Douglas in the background of the photograph. The summit has fine views of Greater Victoria and the Saanich Peninsula to the north.

3. Figure 9—29 shows part of the Saanich Peninsula in March. Daffodils from this area are shipped to many parts of Canada for Easter. What does this suggest about the climate of this area? Here are the figures for Victoria:

	J	F	M	A	M	J	Jl	A	S	O	N	D	Total
Temp. (°F.)	39.2	41.5	45.0	49.2	53.8	57.4	60.0	60.2	57.4	51.7	45.1	41.4	
Prec. (ins.)	4.05	3.13	2.15	1.17	0.98	0.91	0.49	0.65	1.28	2.90	3.63	4.84	26.18
Bright Sunshine Hrs.	66	94	148	197	252	263	322	287	205	130	72	57	2093

(a) Compare winter and summer temperature conditions here with those given for Ladner (Figure 9—7).

(b) The average date of the last spring frost at Victoria is February 28th. Compare this with the date in your neighborhood. The average date of the first



9—28 A large-scale map of Greater Victoria

autumn frost is December 7th. Calculate the frost-free season, which is the longest in Canada. Compare it with the frost-free season in your neighborhood. Flowers are an important cash "crop" in southeastern Vancouver Island. They are sold in many parts of Canada. What market advantage does the climate give to gardeners there?

(c) What is the total annual precipitation at Victoria? Compare this with the total for downtown Vancouver (Figure 9—13) and Prince Rupert (Figure 9—21). The west coast of Vancouver Island averages 100 inches of precipitation per year. Victoria is one of the driest places on the coast of British Columbia because it lies in the lee of the mountains of Vancouver Island and of the Olympic Mountains in nearby Washington State. Descending air from these mountains does not release its moisture and there are no mountains in the neighborhood (like those to the north of Vancouver) to force the airmasses upward. How do the precipitation figures help to explain why irrigation is necessary along much of the east coast plain of Vancouver Island?

(d) What is the annual total of bright sunshine hours received at Victoria? This is among the largest of any major Canadian city. How does it compare with the total in your neighborhood?

(e) Why is Victoria so attractive to tourists during the summer months? What features of its climate have attracted many people from the Prairies to live out their retirement at Victoria?

(f) List some ways in which living conditions and costs at Victoria differ from those at Edmonton as a result of different climatic conditions in these two cities.

Greater Victoria includes the city of Victoria and the nearby municipalities of Oak Bay, Esquimalt, Saanich, and Central Saanich. Together, these had a population of 154,152 in 1961. From your studies of

9—29 Daffodils being grown for market on Vancouver Island (British Columbia Government photo)

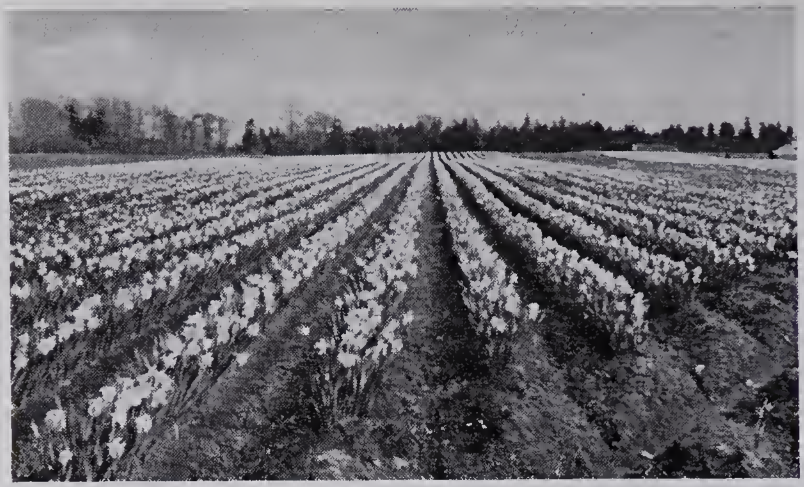
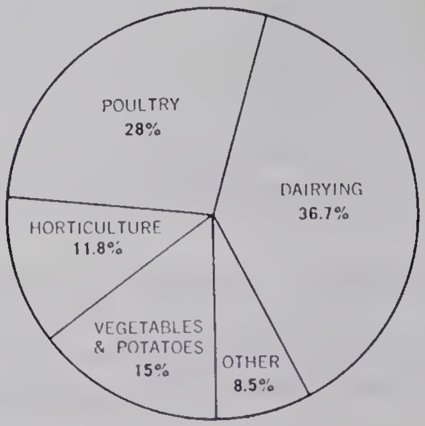


Figure 9-28, suggest reasons for the importance of Esquimalt. Victoria is considered one of Canada's most beautiful cities, with attractive homes, well-kept gardens, parks, and a magnificent waterside location.

The Saanich Peninsula to the north of the city is part of the east coast plain, which contains most of the island's 2700 farms and ranks next to the Lower Mainland as a major lowland region of the province. The pie graph in Figure 9-30 indicates the main forms of agriculture carried on. Although dairying is the most important activity, the island supplies only ten percent of its own milk requirements. The rest must be imported from the Lower Mainland. Figure 9-29 illustrates the chief type of specialized agriculture on the island. The size of the average farm is only 70 acres and many, operated on a part-time basis by retired persons and others, are less than ten acres in extent.

The chief towns of the east coast are Duncan, Nanaimo, Courtenay, Ladysmith, Comox, and Campbell River. All these are important centres of the logging and tourist industries. At Campbell River, some of the best sport fishing in all North America is available. Figure 9-31 shows a fine specimen of the famous Tyee salmon. Campbell River is the centre of the chief power development on Vancouver Island. When the installations there are fully developed, they will generate 500,000 horsepower, one of the largest outputs in the province.

9—30 The main sources of farm income on Vancouver Island



9—31 Vancouver Island is world famous for sport fishing. (British Columbia Government photo)

Nanaimo, with a population of nearly 15,000, is the second largest city on Vancouver Island. Originally a major centre of coal mining, which has now ceased, it has developed in recent years as the "hub" of the central part of Vancouver Island. As the terminus of two ferries from Vancouver, it has also become the main centre of coastwise shipping on the island. How far is it from Vancouver? The important forest industries centred in the neighborhood will be discussed below.

The mountains of Vancouver Island rise abruptly from the east coast lowland. They are deeply penetrated by inlets on the west coast, which form an indented pattern, much like that of the Coast Mountains Region. The shores of these inlets and the mountain slopes contain one of the most productive forests in the world. The mild winters and heavy rainfall are the chief factors in promoting the

9—32 Loggers felling a giant Douglas fir on Vancouver Island (British Columbia Government photo) growth of immense trees, such as those visible in Figure 9-32. Review the climatic graph for Prince Rupert where conditions are very similar. At one station on Vancouver Island, Henderson Lake, an average of 264 inches of rainfall was received annually over a period of 13 years. Study Figure 9-32 very carefully. Compare the size of the people shown with the size of the trees. Notice the lack of branches in the lower and middle portions of the trunk. Describe the forest in the background of the tree being cut. Try to estimate the diameter of the tree in this picture.

Locate Port Alberni in Figure 9-2. Near this town, one can study nearly all aspects of the British Columbia forest industries.* Port Alberni and its "twin," Alberni, have a combined population of more than 15,000 persons, a tenfold increase since 1921 and a threefold increase since 1941. In recent decades, one of the largest combined timber operations in the world has developed there. Two sawmills, a shingle mill, plywood mill, a pulp and paper mill give employment to nearly 4000 people. The pulp and paper mill, founded in 1894, was the first in British Columbia. In 1961, these towns had the fourth highest per capita income of any in Canada.

Alberni and Port Alberni are located at the head of a deep fjord that penetrates far into the interior of Vancouver Island and provides the fine natural harbor needed by an operation that exports three quarters of its production by water. The Alberni Valley lies between lofty mountain ranges that reach elevations of 6000 feet or more. The valley floor and sides are clothed with rich stands of conifers—especially Douglas fir. A minimum annual rainfall of 69 inches (extending to 150 inches in some places) permits rapid growth.

Problems of felling and transporting the big trees of B.C. are much more difficult than those met in the forests of the Canadian Shield. The men in Figure 9-32 are felling a Douglas fir with a chain saw operated by a small gasoline engine. The man at the left is holding the two handles of the saw which consists of a steel blade around which a chain carrying saw-teeth revolves at great speed. First, an undercut is made by means of two parallel cuts. The resulting wedge is pried out by means of a special type of large axe. This ensures that the tree will fall in the required direction. During felling, a fire extinguisher must be on hand because of the risk of fire involved in using the power saw.

After felling, the tree must be scaled—that is, the amount of lumber in it is calculated. Enough lumber to construct five large bungalows may be obtained from a single 170-foot Douglas fir. Branches must be

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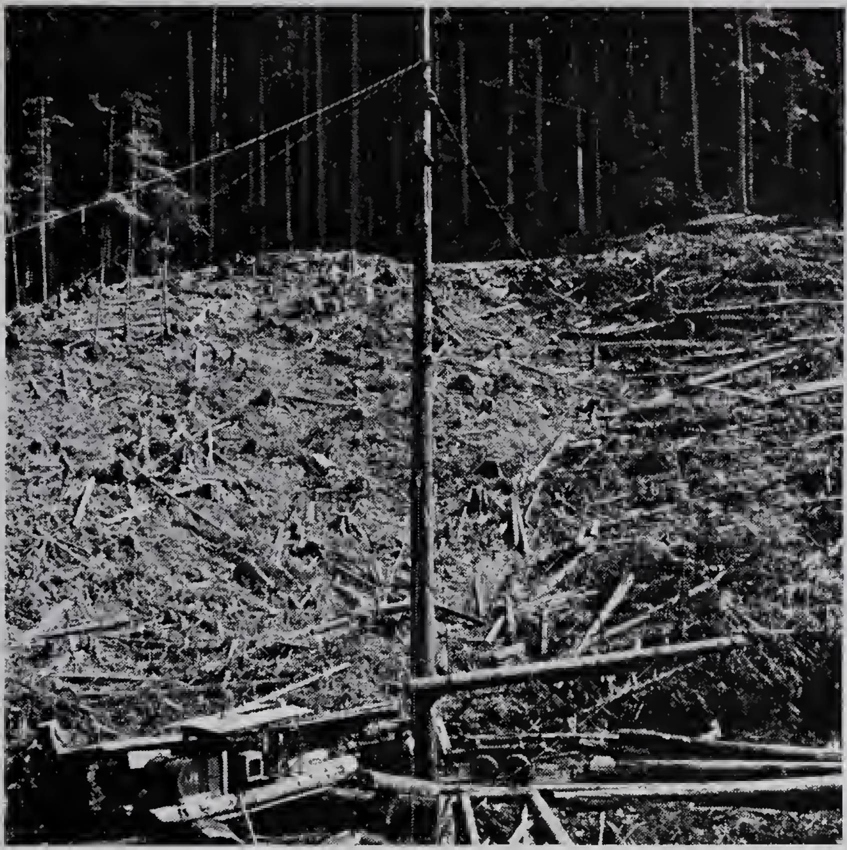
*The following account is based largely on information supplied through the courtesy of Macmillan, Bloedel and Powell River Limited.



9—33 A spar tree with cables attached is used to log steep slopes. (Jack Cash photo)

removed and the tree cut into several lengths for transportation. As forest operations have been extended to very high and steep slopes, road construction has become increasingly difficult. In one logging division of 450 square miles near Port Alberni, more than 500 miles of roads have been built at great expense. A patch selected for logging will cover an area of between 20 and 100 acres. The top of such a patch on a steep slope may be as much as 1000 feet from the road. A wooden or steel spar is equipped with a series of cables which can be extended to any point in the patch. Such an arrangement is shown in Figure 9-33. By these means, logs are moved to the waiting trucks which carry them to the water, where they are dumped and later sorted according to species, grade, and use in the mills. Figure 9-34 shows a man operating a boom scooter in the sorting grounds near Port Alberni. This little power boat enables him to sort the logs more quickly and safely than was possible in the past.

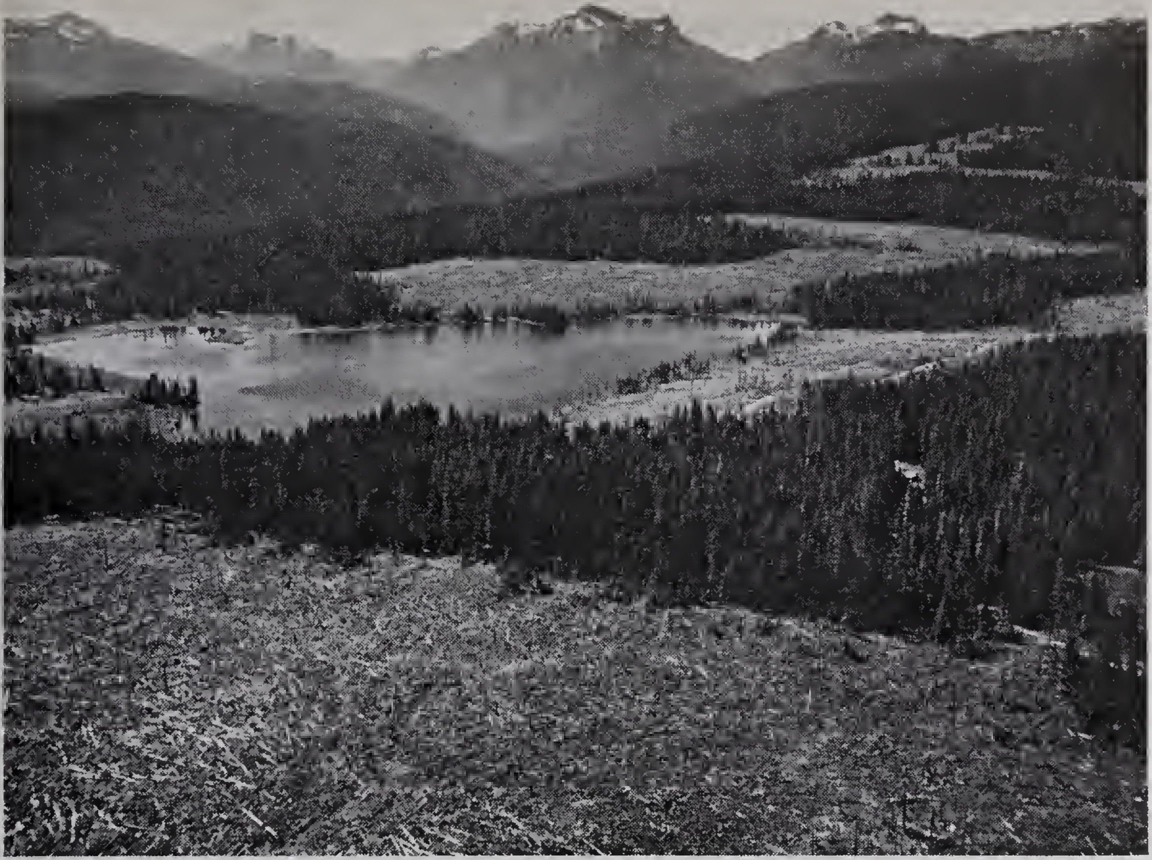
Wise management of Canada's forests is essential since one third of our national income and one third of our exports are based upon them. In the Alberni Valley, trees are regarded as a crop and company owned tracts are called tree farms. Lands leased from the British Columbia government are operated under tree farm licences. All cutting schedules on these lands must be approved by the British Columbia Forest Service. The method of forest management is based on the *sustained yield principle.* Areas cut over must be reforested so that a "harvest"

9—34 A scene in the log sorting grounds near Port Alberni. The man to the left of centre is operating a "boom scooter." Note the hook, to the operator's left, that enables the scooter to grasp and move a log. (Jack Cash photo)

will always be guaranteed in the future. It has been found that the best logging age for a Douglas fir is between 80 and 100 years. Trees grow much more slowly after that and are more subject to diseases and other problems. On the best soil, a fir tree will reach a height of 200 feet in a century. In the Alberni Valley, it is policy to cut down overripe stands and to start new "crops." "Patch" logging is illustrated by Figure 9—35. The patches are re-seeded naturally, within a period of five to eight years, by the trees that surround them. The patches are also a protection against forest fires.

Patch logging is thus an aspect of conservation. Where natural reseeding is not possible, trees may be planted by hand or helicopter. About 10,000,000 trees have been planted in the Alberni Valley since 1941. Because a tree will grow faster if it has more room, much effort is put into thinning the stands. Fertilizers, such as ammonium nitrate, are also used to speed growth. Depending on soil and other conditions, Douglas fir can be expected to yield 50 to 200 trees per acre. Insects and diseases take a heavy toll of the forests and must be combatted by spraying and other means. The ambrosia beetle, for example, may burrow as many as 100 tunnels per square foot of log. Weeds choke off young trees and attempts are being made to control them by spraying. Deer take a heavy toll of young trees. In plantations where deer have browsed, it has been found that trees which should be 40 feet high at 13 years are only five feet high.

Fire is the greatest hazard of all. During the period 1958-61 inclusive, 16,000,000 dollars worth of mature British Columbia timber was burned. In addition, 500,000 acres of immature timber were destroyed. In 1961 alone, the province had 3102 fires which cost 4,500,000 dollars



9—35 "Patch logging" is widely used in British Columbia as a means of forest conservation (Jack Cash photo)

to fight. The majority were caused by human carelessness. During periods of summer drought, logging operations are often closed down because of the fire hazard. Every logger in the Alberni Valley is a trained fire-fighter, and thousands of miles of hose, hundreds of pumps, and numerous tank trucks are maintained. Every logging truck carries a tank of water. In any area where logging operations are in progress plans are such that water can be put on a fire within two minutes of its outbreak. A central radio control system is used for tracking fires on Vancouver Island. A recent development has been the use of a water bomber. On June 22, 1962, a giant Martin Mars water bomber started an air attack against a 200-acre forest fire near Duncan. Such a bomber, with a capacity of 6000 gallons, can be loaded with water within 30 seconds, as it skims along a lake surface, taking in its supply by means of a special valve.

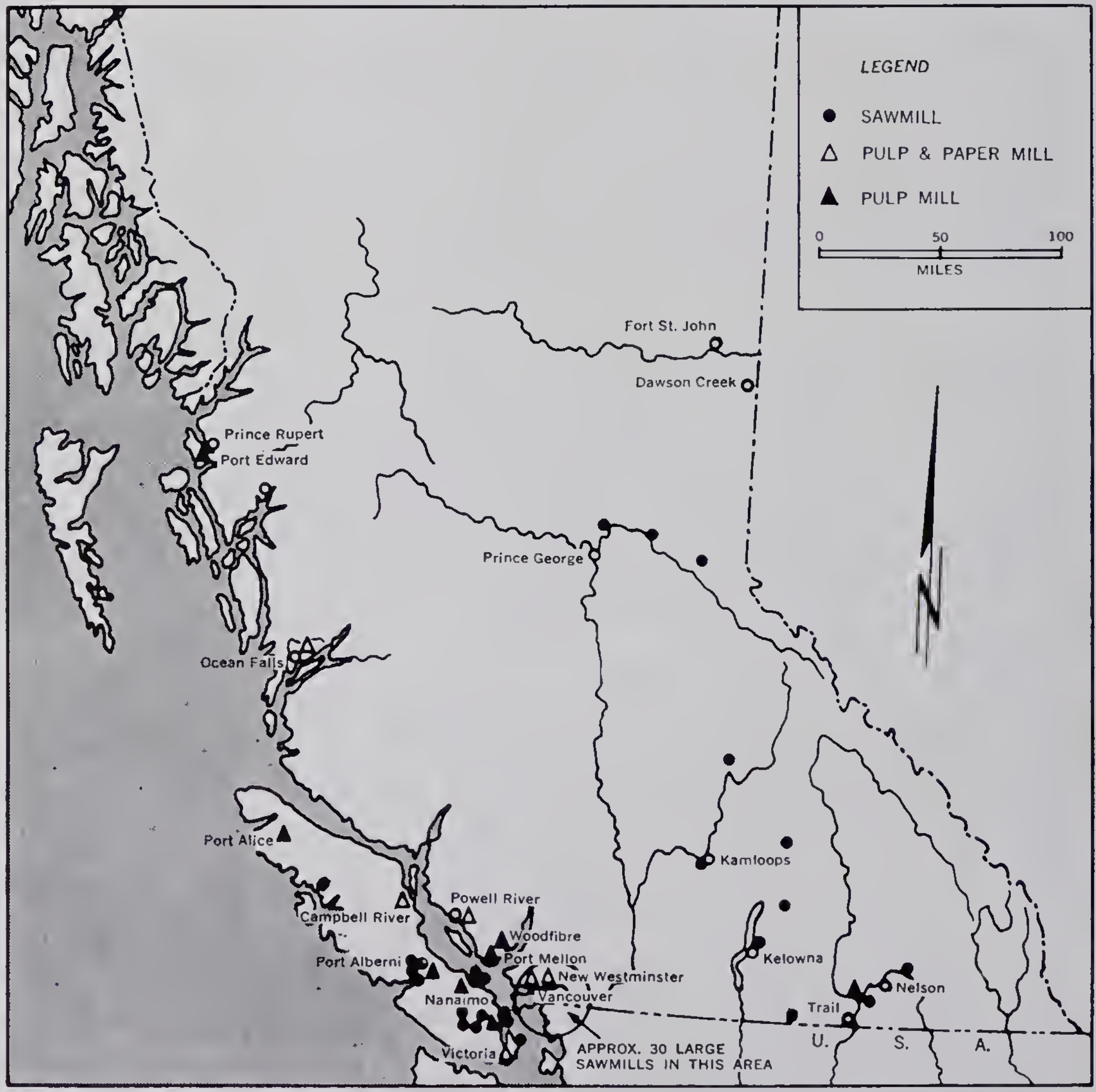
Mill operations at Port Alberni are based on maximum use of the wood. Bark and sawdust are used as fuel (in place of oil) for steam engines and chips from the sawmills are sent to the pulp and paper mill. The latter receives the poorest quality timber. The best quality (all Douglas fir) is used for making plywood. The rest, comprising medium quality timber, is processed as construction lumber. This is done in the two sawmills where cutting proceeds according to sales orders. Production is tied to ship schedules, since delay in loading a freighter may cost as much as 2000 dollars per day. Most of the output is exported by water, mainly to the eastern United States and to

Europe. A shingle mill utilizes mainly cedar and is a further example of the varied use of lumber resources.

The pulp and paper mill is one of the largest in Canada and in 1962 was operating seven days a week, on three shifts. Pulp is exported mainly to Europe and Japan. Most paper goes to the United States.

Plywood is the chief quality product of the Alberni Valley forest industries. Four million panels, each four feet by four, are produced every year. The plywood mill covers four and one quarter acres. Output is sold throughout Canada, in the United States, and in the United Kingdom.

Port Alberni is only one of several major centres of the forest industries on Vancouver Island, which contains 20 percent of British Columbia's mature timber and accounts for one third of the province's annual cut. Other major centres on the island are shown in Figure 9—36. Where are pulp and paper mills located? In recent years, British



9—36 The major forest industries of British Columbia are shown in this map.

Columbia has greatly increased its production of pulp and paper and now accounts for ten percent of Canada's output, ranking ahead of such important provinces as New Brunswick and Newfoundland. This trend has permitted much fuller use of the timber and has greatly reduced waste.

Refer again to Figure 9–36 and note the distribution of sawmills and pulp and paper mills in the coastal area of the mainland. Name the chief centres of production. Greater Vancouver has the largest concentration of sawmills in Canada. Coastal British Columbia, including Vancouver Island, accounts for half the province's output. List the advantages that make the coast forests the most productive in Canada. What natural factors make for the easy, cheap transportation of both primary and finished products? Self-loading and self-dumping log barges have begun to replace booms and rafts on the British Columbia coast. These have greatly reduced transportation costs because lumber can be moved so much more quickly. A boom or raft takes several days to be made up, whereas a barge can be loaded in a matter of hours.

In spite of the advantages, coastal British Columbia now accounts for less of the province's lumber output than it did 20 years ago. Overcutting of the coast forests has forced logging companies to turn to the interior of the province. Locate Prince George in Figure 9–2. This town is now the leading logging centre of the interior. Further east, the densely-forested slopes of the Rocky Mountains provide a huge supply of timber, including Douglas fir and many other species logged on the coast.

It is estimated that half of every dollar's worth of production in British Columbia is based on the forests and that one eighth of the working population depends directly upon them for a living. It is difficult to measure exactly the number of jobs and the earning power created by the forest industries. In the Alberni Valley, for example, in addition to the men who work in the woods and in the mills, there are many others whose jobs depend at least indirectly on the forests. Make a list of such jobs. List some jobs held by people who work far away from the Alberni Valley, but whose living depends to a large extent on the forests of the Valley.

Vancouver Island is not noted for its mineral wealth. Small quantities of coal are still mined, but the Nanaimo fields have closed. A copper deposit is worked at Cowichan Lake. Iron ore is mined on the island near Campbell River and in the adjacent Gulf of Georgia. Nearly all the metal output is exported to Japan. Japanese

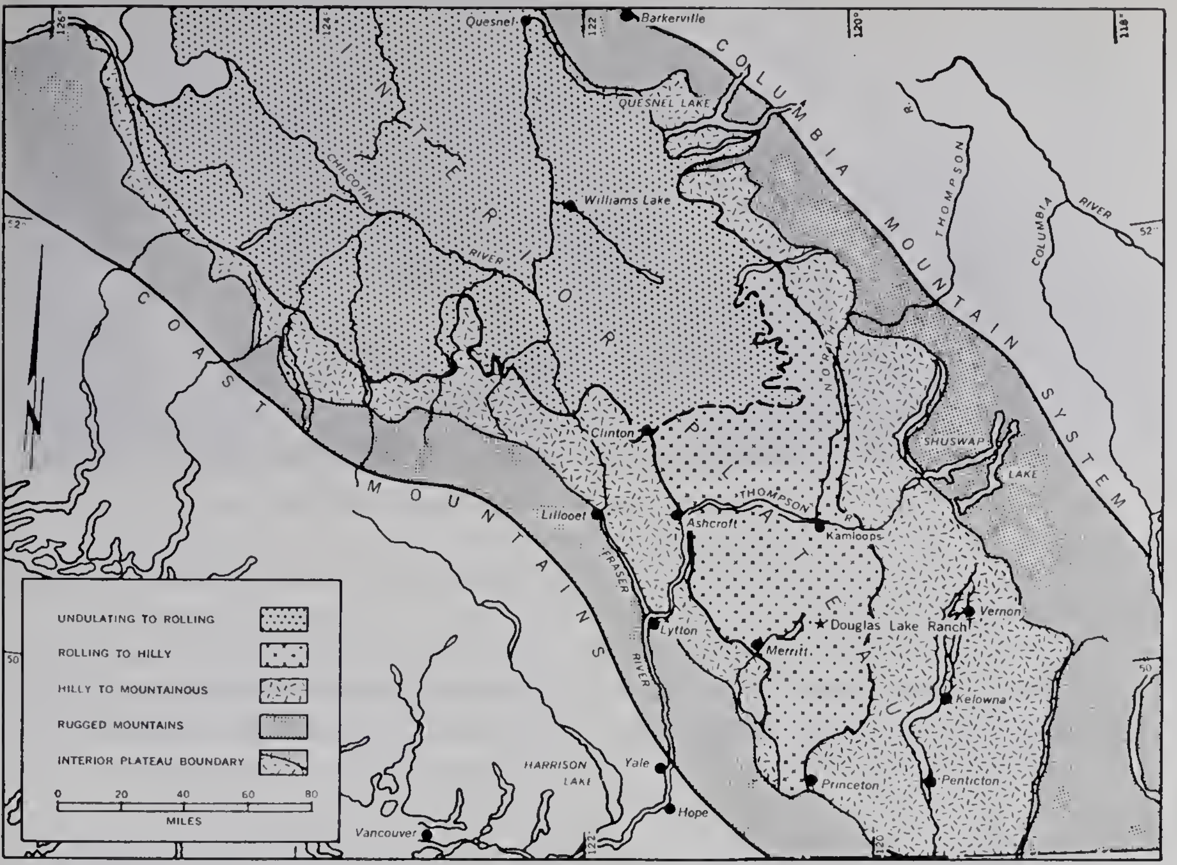
9—37 Part of a great spruce forest on the Queen Charlotte Islands, seen from the air (National Film Board photo)

firms have invested heavily in mineral development in various parts of British Columbia. About 6000 jobs in the province are directly dependent on sales of metals to that country.

To the north of Vancouver Island lie the Queen Charlotte Islands. Locate this remote, windswept group in Figure 9—2. Prince Rupert serves as a major supply centre of the islands and much of the catch from the fisheries that surround them is delivered to Prince Rupert. The central and western portions of the islands appear as shown in Figure 9—37. Describe the main features of this landscape. Which areas already studied does it most resemble? As elsewhere in coastal British Columbia, the forests supply the main source of wealth. The famous Haida Indians live there and produce the totem poles which are among the unofficial symbols of British Columbia. The province contains about 18,000 Indians—one fifth of the Canadian total. They comprise many different tribes, some of whom still engage in their ancient occupations of fishing and trapping. Others are entering more and more into the urban, industrial life of British Columbia.

Reviewing the geography of Vancouver Island

1. Briefly describe the two regions of the island. In which one are most of the people concentrated? Comment on agriculture in this region.
2. Which factors account for the presence on the island of the greatest forests in Canada?
3. List some ways in which the forest industries of coastal British Columbia are different from those of eastern Canada.
4. Explain these terms: patch logging; spar tree; boom scooter; tree farm; sustained yield.
5. Describe the various enemies of the forest and state some measures that are used to conserve the timber supply.
6. What proportion of British Columbia lumber is produced in the interior? Why has the coast's proportion of the province's output decreased?



9—38 General map of the Southern Interior, showing relief, main rivers, and towns

THE SOUTHERN INTERIOR: A DRY LAND OF CATTLE, LUMBER, AND FRUIT

Figure 9-38 shows the limits of the region called the Southern Interior. Which mountain range forms a boundary on the west? To the east, the Columbia Mountains extend to the Rocky Mountains. The Southern Interior consists of a great plateau drained mainly by the Fraser River and its tributaries. Which part of this plateau is the most rugged according to the map?

The Fraser River and its valley have long been the main link connecting the various parts of the Southern Interior. But it has quite a different character from the wide, slow-moving stream that we studied in the Lower Mainland Region. Part of this character is revealed in Figures 9-39 and 9-40.

The middle Fraser country

1. Figure 9—39 shows a freight train of the Pacific Great Eastern Railway winding its way through the Fraser canyon near Lillooet. Locate Lillooet in Figure 9—3.
(a) Find the river in the photograph.
(b) Describe the canyon walls opposite the railway line.

9—39 A scene in the Fraser Canyon near Lillooet (British Columbia Government photo)

(c) What clues does this picture provide to the climate of the southern interior of British Columbia?

2. The Fraser River was first explored by Simon Fraser in 1807. After passing the present site of Lytton (see Figure 9—3), Fraser reached Hell's Gate, the most dangerous part of his journey. Figure 9—40 shows how this place looks today.

(a) Describe the state of the water as it appears in this photograph.

(b) What is the structure on the far side of the river?

(c) Describe the canyon wall on the same side. Which bank (east or west) are we looking at?

(d) Why is there so little vegetation on the canyon sides?

(e) Why would the road be a dangerous one on which to drive?

Great improvements have been made on the canyon roads in recent years, including a tunnel that bypasses one of the worst areas shown in Figure 9—40.

3. The Hell's Gate area was described by Simon Fraser in his own words as follows.*

"Here we were obliged to carry up among loose stones in the face of a steep hill, over a narrow ridge between two precipices. Near the top, where the ascent was perfectly perpendicular, one of the Indians climbed to the summit, and with a long pole drew us up, one after another. This took three hours. Then we continued our course up and down, among hills and rocks, and along the

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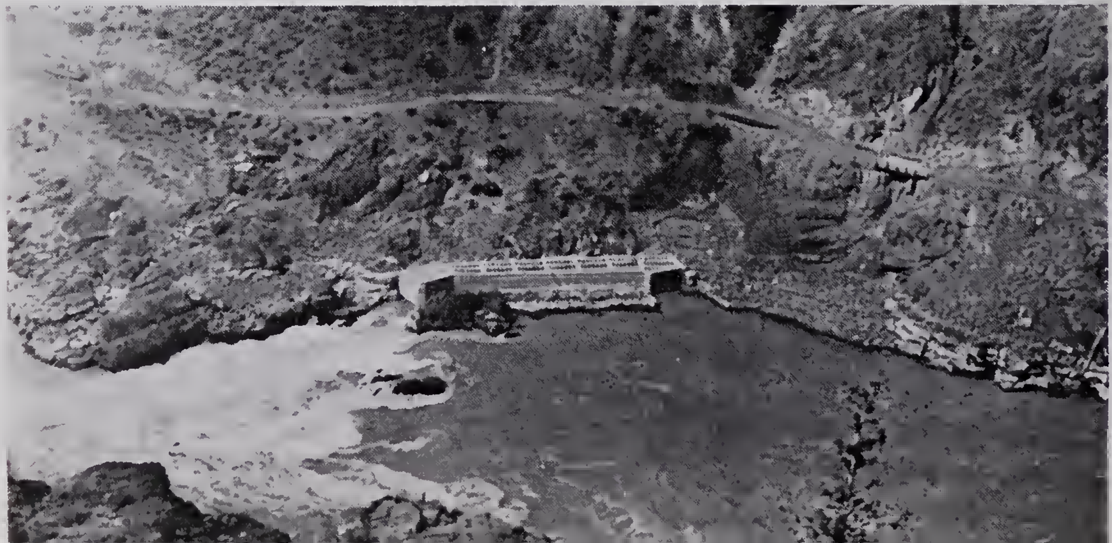
*This extract from Fraser's journal is quoted from *Simon Fraser, Letters and Journals, 1806-1808,* edited by W. Kaye Lamb and published by the Macmillan Co. Ltd., Toronto, as one of their series of Pioneer Books (1960). Permission of the publishers to quote this material is gratefully acknowledged.

9—40 The Fraser River at Hell's Gate. The fishway on the near side of the river is obscured by the cliff in the foreground.



steep declivities of mountains, where hanging rocks and projecting cliffs at the edge of the bank made the passage so small as to render it difficult even for one person to pass sideways at times. . . . I have been for a long period among the Rocky Mountains, but have never seen anything equal to this country, for I cannot find words to describe our situation at times. We had to pass where no human being should venture. Yet in those places there is a regular footpath impressed, or rather indented, by frequent travelling upon the very rocks. . . . We had to ascend precipices by means of ladders composed of two long poles placed upright and parallel with sticks crossways tied with twigs. Upon the end of these others were placed, and so on for any height. Add to this that the ladders were often so slack that the smallest breeze put them in motion. . . ."

(a) Select the words and phrases from Fraser's description that apply to the terrain shown in Figure 9—40.
(b) Which part of his account gives you some idea of what travel in the area was like before any roads existed?

4. A young adventurer of the gold rush days, 50 years later, described his experiences carrying freight up and down the river. Crews rowed and poled through the fairly calm stretches and towed or portaged their boats through the rapids between Yale and Lytton. This is the adventurer's description of the Fraser current:*

"It may give some idea of the strength of the current, when I tell my readers that at a spot some ten miles above Yale, a little over one hundred miles from the mouth of the river, the Fraser . . . flows through a channel in the rocks of only one hundred and sixty feet in width. The sides of this place, graphically called 'Hell's Gate,' are nearly perpendicular and the high-water mark (in the summer when the snows have melted) is no less than one hundred feet above low-water mark in the winter.

At the end of the twelfth day we hailed the sight of the blue waters of the Thompson, running side by side with the sandy-colored stream of the Fraser for some distance, and after a sharp pull reached the end of our journey. . . ."

(a) Locate Yale on the map in Figure 9—3.
(b) How wide was the Fraser at Hell's Gate. (It is somewhat narrower there today as a result of rock slides created by railway building.)
(c) How many feet does the Fraser rise during the summer? (Note that in some summers it carries as much water as the St. Lawrence below Montreal, where that river is at least one mile wide.)
(d) Where does the Thompson River join the Fraser? Why is the Fraser sandy-colored?
(e) What happens to the material carried down its canyon by the Fraser?

Although Kamloops was established as a fur trading post as early as 1812, and was only one of several such posts in existence by 1850, it was the gold rush that first brought large numbers of people to the Southern Interior. Between 1858 and 1875, more than 30,000 people entered the region. Most arrived by the famous Cariboo Road that was built during the 1860s. The chief destination of most miners was

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*The young adventurer was R. Byron Johnson who described his experiences in *Very Far West Indeed.* This quotation is from *A Source-book of Canadian History,* edited by Reid, McNaught, and Crowe, and is reproduced here by kind permission of the publishers, Longmans, Green and Company, Toronto.

Barkerville, which became, for a time, the largest town in British Columbia. Today, the modern Cariboo Highway, following much the same route as the old road, takes the traveller to the central and northern interior of British Columbia.

Most of the gold seekers met disappointment and returned home or moved on elsewhere. Those who remained established many of the settlements shown in Figure 9-2. Some took up ranching, as there was a great demand for beef in the new mining settlements. The first cattle were driven up the Okanagan Valley along the fur brigade trail from the United States. Most of the ranches were established near the Cariboo Road and some served as road houses for those on route to the goldfields. The first cultivation of crops and the first orchards in the Okanagan Valley were established during the mining days. Nearly all the buildings in the settlements were of wooden construction and gave rise to a logging industry in the southern interior. Thus ranching, farming, and logging, three of the most important economic activities of the Southern Interior today, owe their beginning to the gold rush.

Douglas Lake — a famous modern cattle ranch in Southern British Columbia

1. Figure 9—41 shows a typical scene on the Douglas Lake Ranch, about 40 miles south of Kamloops. Locate the ranch in Figure 9—38. It was founded in the 1880s to feed the construction gangs that were building the Canadian Pacific Railway at the time.

(a) What work is being done by the men in the photograph?

(b) Describe the relief of this land.

(c) List all the factors that make this area suitable for cattle raising.

(d) Where is most of the forested land located?

2. Figure 9—42 shows a map of the main ranchstead of the Douglas Lake Ranch. The ranch "runs" 10,000 head of cattle and is the largest unit in Canada. The ranchstead shown is one of four on the ranch.

(e) How many buildings comprise the ranchstead?

(b) How can you tell that the Douglas Lake Cattle Company employs a large number of permanent workers who live on the ranch?

(c) What sources of food are available locally to feed the workers referred to in (b)?

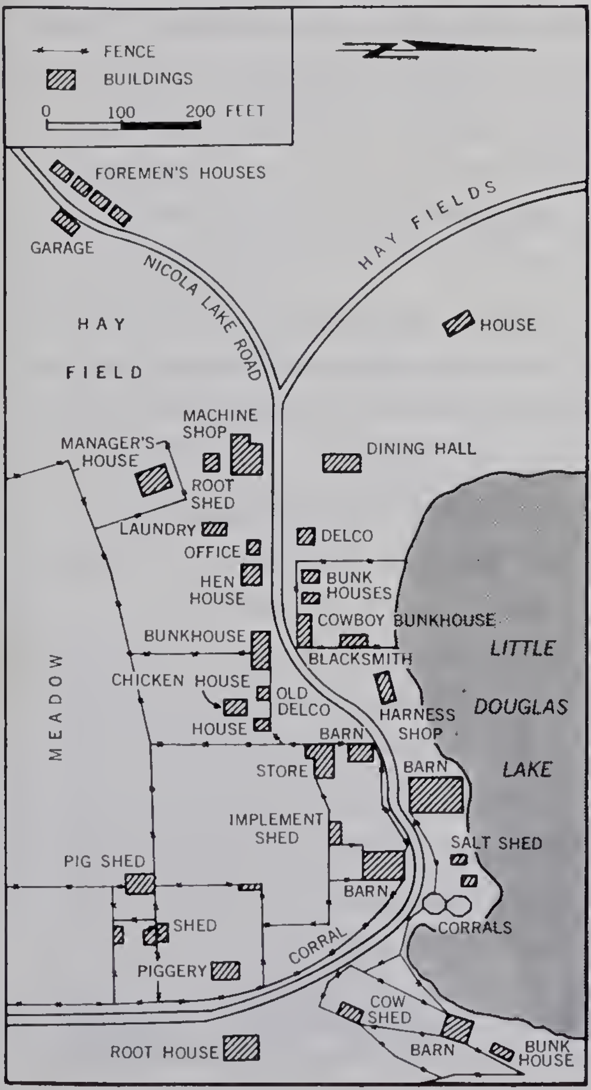
(d) What evidence is there that winter feed must be supplied to the animals?

(e) How many barns are there? These house the work and riding animals. Where do the cattle spend the winter?

Read the following for further information on this ranch:*

> "Although various sources of food are available for the 90 permanent employees, no milk cows are kept on the Douglas Lake Ranch. The cultivation of hay is the main work on the ranch during the summer months. In addition to what is cultivated, about 1000 tons are bought annually from the Indians on two nearby reservations. In winter, the cattle are brought to the feed grounds on the bottom

*This account is based partly on information supplied through the courtesy of the Douglas Lake Cattle Company.



9—41 (above) A scene on the Douglas Lake Ranch in the Southern Interior (British Columbia Government photo)

9—42 A map of the main ranchstead of the Douglas Lake Ranch (after Professor T. R. Weir)

> land where the hay is cut and stacked and where good water is available. Salt is provided to cattle at all times. No shelter is provided other than what is available from natural sources such as trees and willow brush. There is good grazing land on the ranch property and the snow (a maximum of 30 inches in most winters) is not too heavy in this area of low annual precipitation. It is considered safe to go into the winter with a supply of hay on hand of one ton per head of cattle."

Despite the dry climate of the Southern Interior, logging and sawmilling are important activities. The Douglas Lake Cattle Company operated its own sawmill until 1956, but in that year sold its timberlands. The ranch covers 500,000 acres – an area about equal to that of the whole Fraser delta – of which about two thirds is held under grazing permit from the provincial government. In respect to its large size and the fact that *most* of the acreage is not owned, the ranch is not typical. A survey of 80 ranches in the Southern Interior in 1959 revealed that the average size was 3211 acres, of which 1984 were owned. Figure 9-43 is a graph showing the land use on an average ranch. There were 345 animals on such a ranch, and the average winter feeding period was 4.3 months (about 130 days). For every pound of beef produced, nearly nine pounds of hay was used. The cost of providing hay is the most critical factor in operating a profitable ranch. Most ranches maintain an irrigation system. How many acres were irrigated on the average ranch in 1961, according to Figure 9-43? Water rights are inherited and are sold with the land.

The summer range on the average ranch includes a large amount of land leased from the provincial government. Such leases cover open grassland which may be leased for periods up to 21 years. Rental of such lands varies from 4 to 50 cents per acre per year. Grazing permits apply to *forest range* – that is, to wooded areas with open grass spaces. In 1960, in the Lillooet District, grazing permits for cattle cost 17 cents per head per month. Half the fees collected from grazing permits are used to improve the range. This involves building of bridges, construction of dams, weed control, the removal of wild horses, and maintenance of trails. Cattle are driven to summer range towards the end of May. By late June in the Lillooet District, they are grazing in alpine meadows at about 4000 feet above sea level. By the end of July, they may have reached the highest grazing level, at 7000 feet. The rancher leaves a supply of salt for them and the animals graze unattended on the alpine meadows. In September and October, they are driven back to the home pastures.* Some ranches keep sheep,

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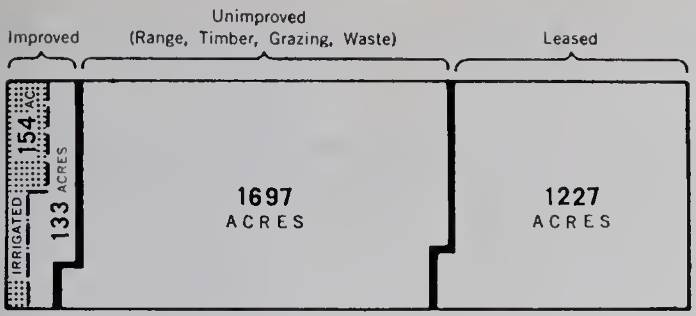
*The foregoing information and other material on cattle ranching in this chapter is based partly on "The Physical Basis of Ranching in the Interior Plateau of British Columbia" by T. R. Weir, in *Geographical Bulletin* No. 3, 1953, Ottawa.



9—43 Land use on a ranch of average size in interior British Columbia

but these are not nearly as important as cattle. Kamloops has an annual wool market. Canadian lamb commands a good price.

In the 1959 study of ranching, already referred to, it was found that part-time ranches averaged 653 acres in size and kept 69 head of stock. These ranches were called "part time" because their owners work at other jobs off the ranch in certain seasons. Logging is the most important of these. Such non-ranch income averaged $2774 per year on the ranches studied. Some ranches cater to tourists. Such "dude" ranches contribute to a tourist industry that in some parts of the Southern Interior is now the chief source of income.

Ranching in the Southern Interior — A Summary

1. How did the gold rush give rise to cattle ranching in the Southern Interior?

2. State some climatic factors favorable to and unfavorable to cattle and sheep raising in the Southern Interior. Figure 9—44 is a climatic graph of Kamloops.

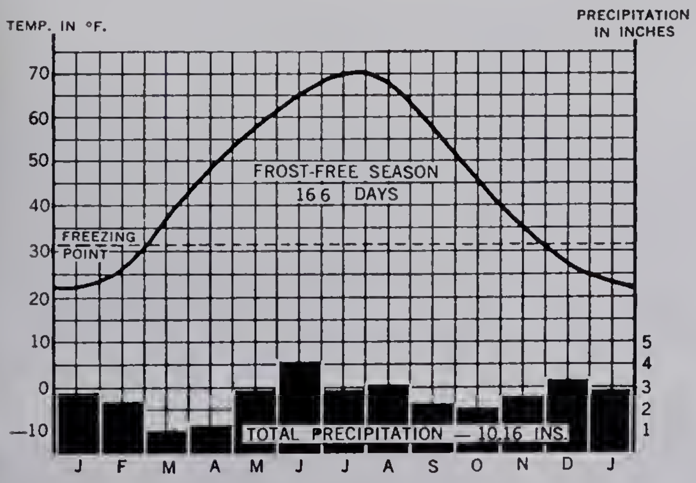
(a) What is the January average at this station? Compare it with that of Victoria.

(b) What is the July average at Kamloops? The highest temperature ever recorded here was 107°F. This compares with a record high of 92°F. at Vancouver.

(c) What is the total annual precipitation at Kamloops? Compare this total with that for Prince Rupert, shown in Figure 9—21.

(d) State some characteristics of the climate of the Southern Interior suggested by the climatic graph of Kamloops. Give reasons why the climate of this region differs from that of the coastal regions.

3. Suppose that you are a cowboy employed on the Douglas Lake Ranch. Make a list of your work activities from season to season throughout the year.



9—44 Climatic graph of Kamloops

4. Vancouver is the chief market for the cattle of the Southern Interior. Refer to Figure 9—61 and trace the route by rail of a shipment of Kamloops "show beef" to the Lower Mainland.

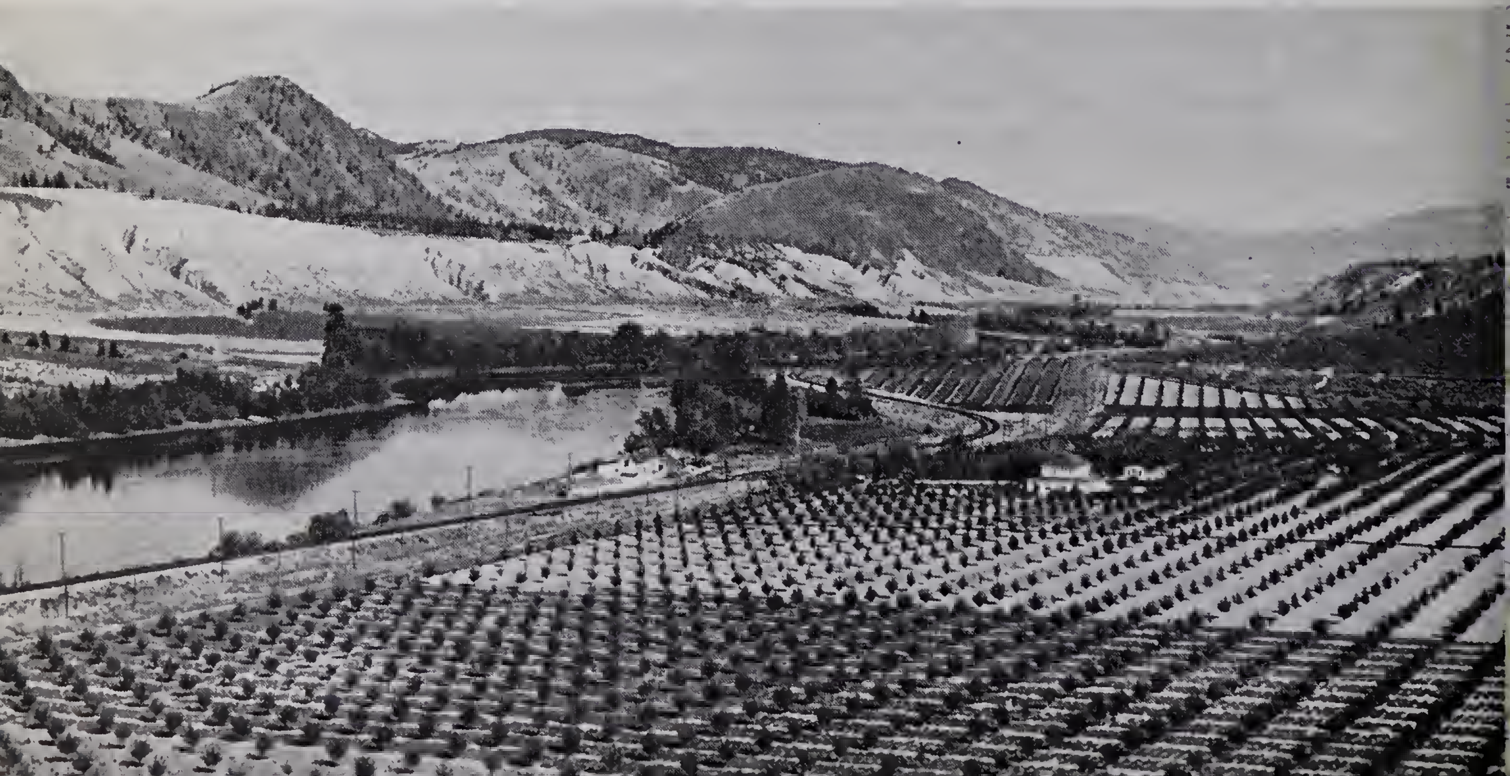
Kamloops is the regional capital of the ranchlands of the Southern Interior and its climate is quite representative of lower elevations in the region. No other place better illustrates the great variety of land use and activity that have influenced development in this part of the province since 1945.

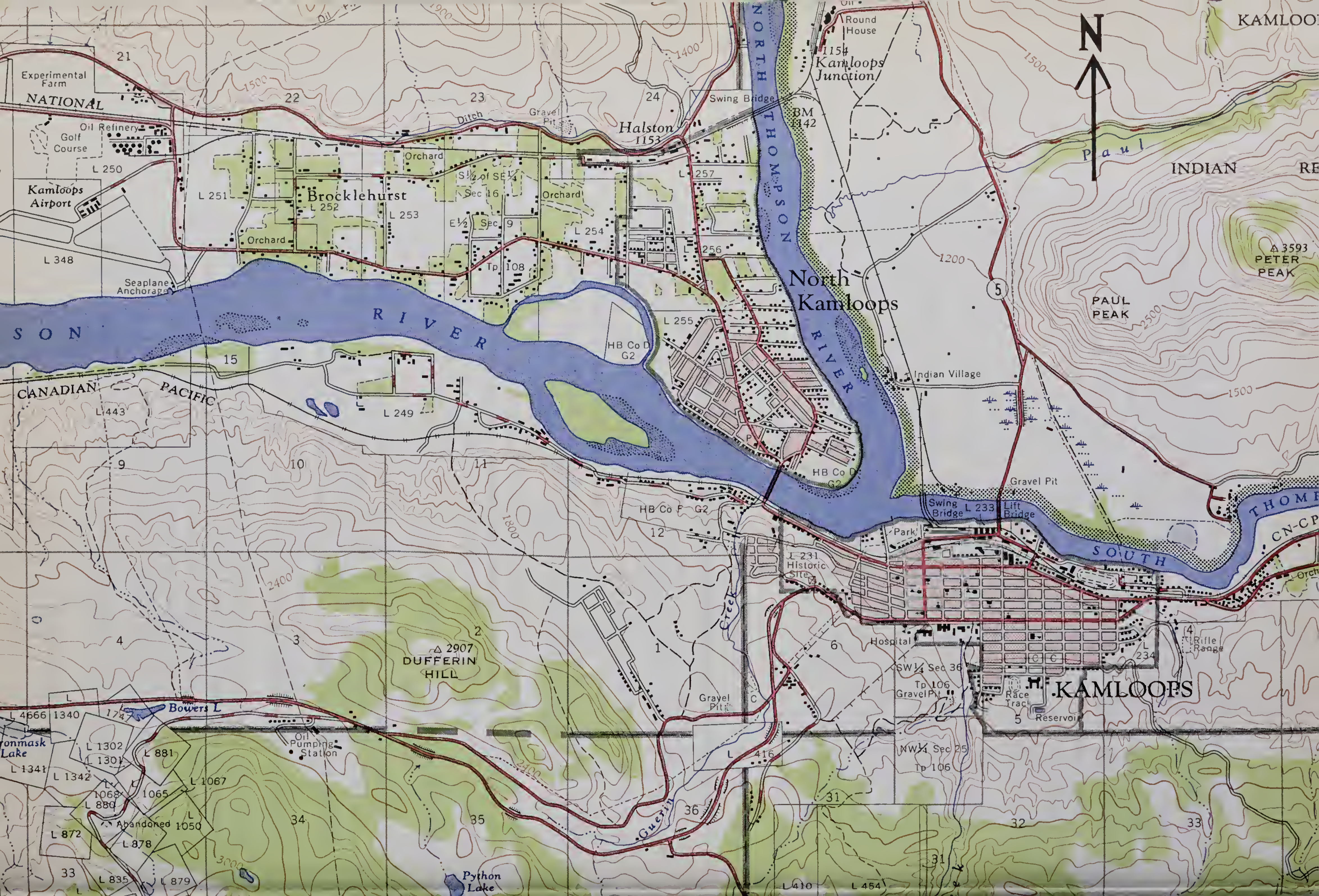
Why is Kamloops a major interior settlement of British Columbia?

1. Kamloops is an Indian name meaning "the meeting of the waters." Which waters meet there?
2. Figure 9—45 shows the South Thompson River near Kamloops.
(a) Study the land in the foreground. How is it used?
(b) Irrigation of this land is necessary. How does your study of the climatic graph in Figure 9—44 explain this fact? What evidence of a dry climate does the photograph provide?
(c) A feature of the scenery of many parts of the Thompson and Fraser valleys are the "benches" or stretches of level land found on each side of these rivers. Locate two of these benches, separated by a steep cliff, on the far side of the South Thompson River in the photograph.
3. Study Figure 9—46, a part of the 1:50,000 topographic map of Kamloops. Locate the area shown in Figure 9—45 on the map.
(a) On which bank of the South Thompson River is the foreground area of Figure 9—45 located?
(b) Describe the location of the other main orchard areas in Kamloops.
(c) Draw a section or profile from Peter Peak to the 2000-foot contour on the south bank of the South Thompson River.

9—46 (opposite) Part of the 1:50,000 scale topographic map of Kamloops (National Topographic Series, Sheet 92 I/9 west half)

9—45 A scene on the South Thompson River near Kamloops (National Film Board photo)




N
Experimental Farm
NATIONAL
Oil Refinery
Golf Course
Kamloops Airport
L 250
L 348
L 251
Brocklehurst
L 252
L 253
Orchard
S½ of SE¼ Sec 16
E½ Sec 9
Tp 108
L 254
L 255
L 256
L 257
Ditch
Gravel Pit
Halston 1153
Swing Bridge
Round House
1154 Kamloops Junction
BM 1142
NORTH THOMPSON RIVER
North Kamloops
Seaplane Anchorage
SON RIVER
HB Co D G2
HB Co F G2
HB Co D G2
CANADIAN PACIFIC
L 443
L 249
15
9
10
11
12
21
22
23
24
Indian Village
Paul
INDIAN
KAMLOO
RE
Peter Peak 3593
PAUL PEAK
5
Gravel Pit
Swing Bridge
L 233
Lift Bridge
Park
L 231 Historic Site
SOUTH THOMP
CN-CP
Hospital
SW¼ Sec 36
Tp 106 Gravel Pit
Race Track
Reservoir
KAMLOOPS
L 234
Rifle Range
NW¼ Sec 25
Tp 106
DUFFERIN HILL
2907
Creek
Guerin
Gravel Pit
L 416
Oil Pumping Station
Bowers L
Ironmask Lake
L 4666
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L 1302
L 1301
L 1341
L 1342
L 881
L 1067
1068
L 880
1065
Abandoned
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L 878
L 835
L 879
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L 454
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2500
2100
3000

4. (a) From the map, describe the general location of Kamloops and North Kamloops.
(b) Kamloops was originally an Indian encampment and a fur trading centre. What evidence is there of these activities on the map?
(c) Kamloops is on the route of the major oil and gas pipeline that serve British Columbia. What evidence is there on the map to support this statement? Where do these pipelines originate? Where do they terminate? (See Figure 9—60.)
(d) What evidence is there that industries based on oil have begun to develop at Kamloops? What local mineral resources are available?
5. (a) What evidence is there that Kamloops is a major junction of rail and road routes? Note the number of bridges across the rivers here.
(b) Describe the location of these routes in relation to the local relief.
(c) Find evidence of a "ribbon" pattern of settlement that is developing at Kamloops.
(d) Daily air flights connect Kamloops with Vancouver and other cities. Describe the location of Kamloops airport.
6. The Kamloops area supports an important logging and sawmilling industry. The map and photograph suggest that most of the immediate area is unforested. At what elevations do wooded areas occur? There are heavily-wooded areas on the hillsides nearby.
7. In 1961, Kamloops had a population of more than 10,000 people and was one of the largest cities in the Southern Interior. It serves as a regional capital for places as much as 125 miles away.
(a) By reference to an atlas map, name some smaller places that would look to Kamloops as their main supply and market centre.
(b) From your studies so far, state the services that the city supplies to its hinterland.
(c) Summarize the reasons why Kamloops has become a city of major importance in the Southern Interior.

Livestock, especially beef cattle, account for most of the agricultural production of the Kamloops region. Poultry and sheep are raised and cattle supply local needs. Hay and grain for fodder are the chief crops. Acreage in tree fruits, vegetables, and potatoes has declined since 1950. There is much more potential farmland on the upper benches but irrigation of such land is costly. It is generally too expensive to lift water more than 300 feet, which is the minimum elevation above the valley of most of these benches.

Logging and sawmilling provide the main sources of income in the Kamloops region. Although annual precipitation is low in the valleys, it increases at higher elevations and this permits the growth of a variety of trees. Postwar lumber needs have made it profitable to tap such sources. There are 210 sawmills within 125 miles of Kamloops and the forest industries employ 3000 people. A plywood plant has been established, and a pulp mill is a possibility. Most processed lumber is shipped to the Prairies or exported to the United States.

Although mining has declined in importance, major copper deposits are under development at Ashcroft and Merritt. Smelting and refining of this metal are possibilities for the future. Kamloops' position astride oil and gas pipelines from northeastern British Columbia and from Alberta have given rise to the oil-refining industry. Petrochemical industries, of the type noted at Sarnia but on a smaller scale, are likely future developments.

No place in British Columbia has a more central location with respect to tourist and recreation development. The historic Cariboo country to the north, the Okanagan Valley to the south, and several great national and provincial parks in the mountain areas to the east provide opportunities for every form of outdoor recreation. Kamloops, like every town in the area, has many motels, campgrounds, and other facilities.

Kamloops has the great advantage of exceptional transportation facilities. An atlas or road map will make this clear. The Canadian Pacific Railway reached here in 1886 and later the city became a divisional point for the Canadian National system as well. The opening of the Trans-Canada Highway (Route 1 on the map) in 1959 is already assisting the growth of Kamloops. There is easy communication with the Okanagan Valley and United States border points to the south. Route 5 links up with the highway to Edmonton and, when this road becomes modernized, Kamloops will again benefit. Describe possible routes to Vancouver from Kamloops. How far away is that city?

The Okanagan Valley — British Columbia's Fruit Belt

The Okanagan Valley is the chief centre of population in the Southern Interior of British Columbia. Study Figure 9-61 and note the main routes through this sub-region. Describe the route by road and rail from Penticton to Vancouver. How far is Penticton from Vancouver? In what ways is the Kamloops district better served by transportation facilities than is the Okanagan Valley?

The Okanagan Valley is world famous as one of Canada's two largest fruit-growing regions. A study of this industry can best begin with a visit to an orchard.[*]

> Mr. J. Towgood's orchard is located near Summerland. Find this town on the map in Figure 9—48. Study the map of Mr. Towgood's orchard in Figure 9—47.

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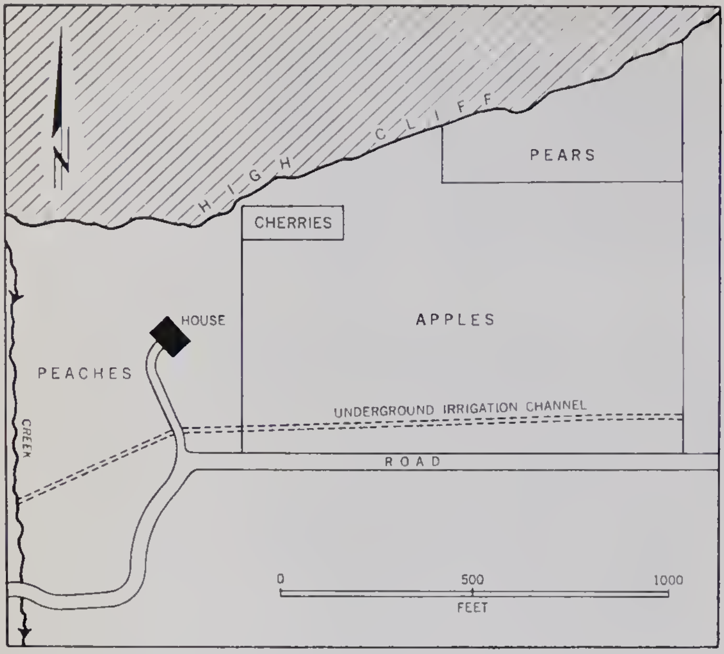
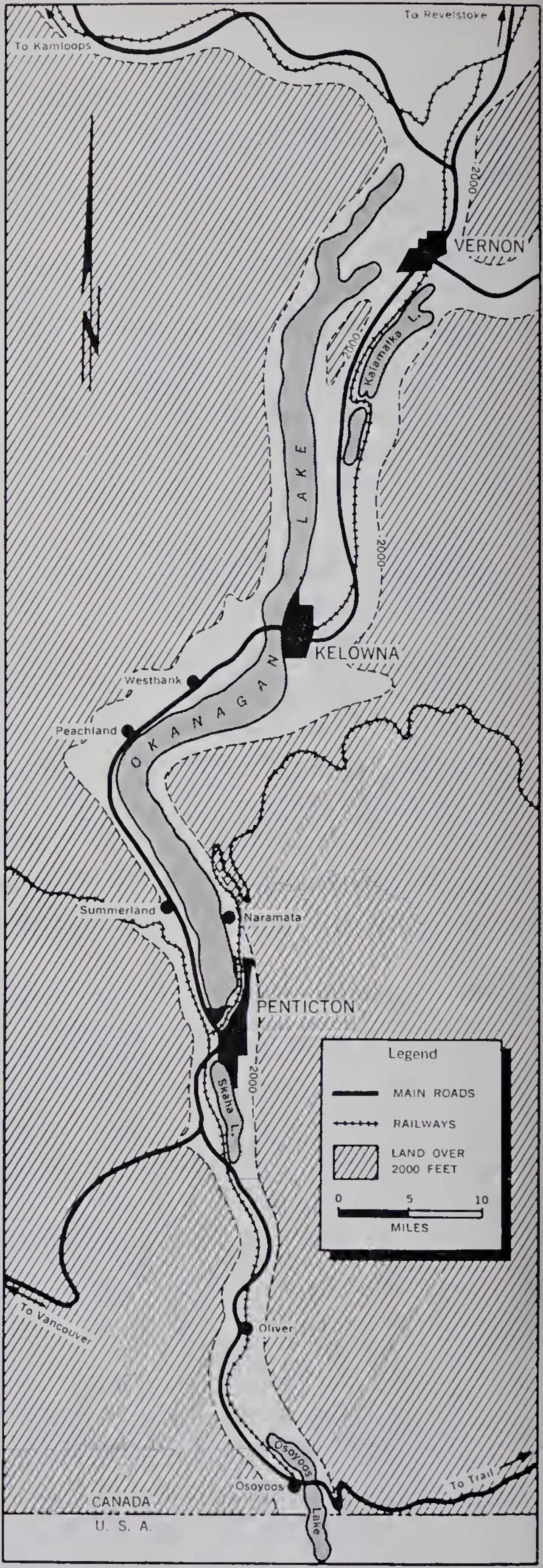
[*] The authors are indebted to Mr. J. Towgood of Summerland, B.C., and to Mr. R. C. Honeybone of the Institute of Education, University of London, who gathered the data on which this study is based. Thanks are also due Dr. D. V. Fisher and Dr. S. W. Porritt of the Research Station maintained by the Canada Department of Agriculture at Summerland for valuable information supplied on the tree fruit industry of British Columbia.



9—47 Sketch map of Mr. Towgood's orchard near Summerland



9—48 A general map of the Okanagan Valley

Name four types of fruit grown. Which type occupies the most acreage? The property comprises 36 acres of which fruit trees make up 24 acres. This compares with an average size of only ten acres throughout the Okanagan Valley. As the map indicates, Mr. Towgood must irrigate his land. Water in the district is obtained from several small lakes located in the hills above Summerland. Locate the creek on the Towgood property. In which direction does it flow? A small dam about half a mile up this creek stores water which is then brought underground and distributed to the orchard by means of aluminum piping. The introduction of aluminum piping into the Okanagan Valley since 1945 has greatly changed methods of irrigation. Formerly, wooden flumes carried water to the orchards where it was distributed by furrows or ditches. This furrow system caused soil erosion. Today, three quarters of the orchards use sprinkler irrigation which is much more efficient. Light aluminum piping is easily moved and every part of the orchard can be properly watered. The Summerland district receives only 11 inches of precipitation in a year. Mr. Towgood adds the equivalent of 36 inches by irrigation, which is carried out mainly during the spring and summer. The Summerland area receives nearly 2000 hours of bright sunshine each year and this is a very favorable factor in fruit growing. The frost-free season averages about 177 days.

Although his soils consist of fine black humus,* Mr. Towgood finds it necessary to apply fertilizer regularly. His orchard is seeded to grass, which is cut two or three times each year and left to rot. He also uses sprays to apply chemicals.

McIntosh apples are Mr. Towgood's main crop. He also grows several other varieties of apple. The other fruits indicated in Figure 9—47 help to spread the labor load. The crop is marketed through British Columbia Tree Fruits Limited, a co-operative organization of growers that maintains quality and fixes prices. A cold storage plant at Summerland and a cannery at Kelowna handle a large proportion of Mr. Towgood's crop. About half the production of the Okanagan Valley is sold in the four western provinces. The rest is sold in the United States, the United Kingdom, various other European countries, and in other lands such as South Africa, Malaya, and Egypt.

A further study of fruit growing in the Okanagan Valley

1. (a) List all the factors favorable to fruit growing in the Summerland district, judging from the account of Mr. Towgood's orchard.
(b) What is Mr. Towgood's main problem? How does he meet it?
2. Review the study of Mr. White's property in the Niagara Fruit Belt, as described in Chapter 2, pages 27-40.
(a) Compare climate and soil conditions in the two orchards.
(b) Compare the properties in respect to size, land use, and problems faced by the owners.
(c) Compare the marketing situation faced by Mr. Towgood with that faced by Mr. White. Why are marketing conditions so different?
3. Study Figure 9—49 which shows a scene at Westbank, on the shores of Okanagan Lake near Kelowna.
(a) What forms of land use are evident in the photograph? Describe the location of the cultivated land. This is a typical "bench" once occupied by the waters of Okanagan Lake, which occupies a channel deepened by glaciers during the Ice Age. Okanagan Lake has a maximum depth of 700 feet.

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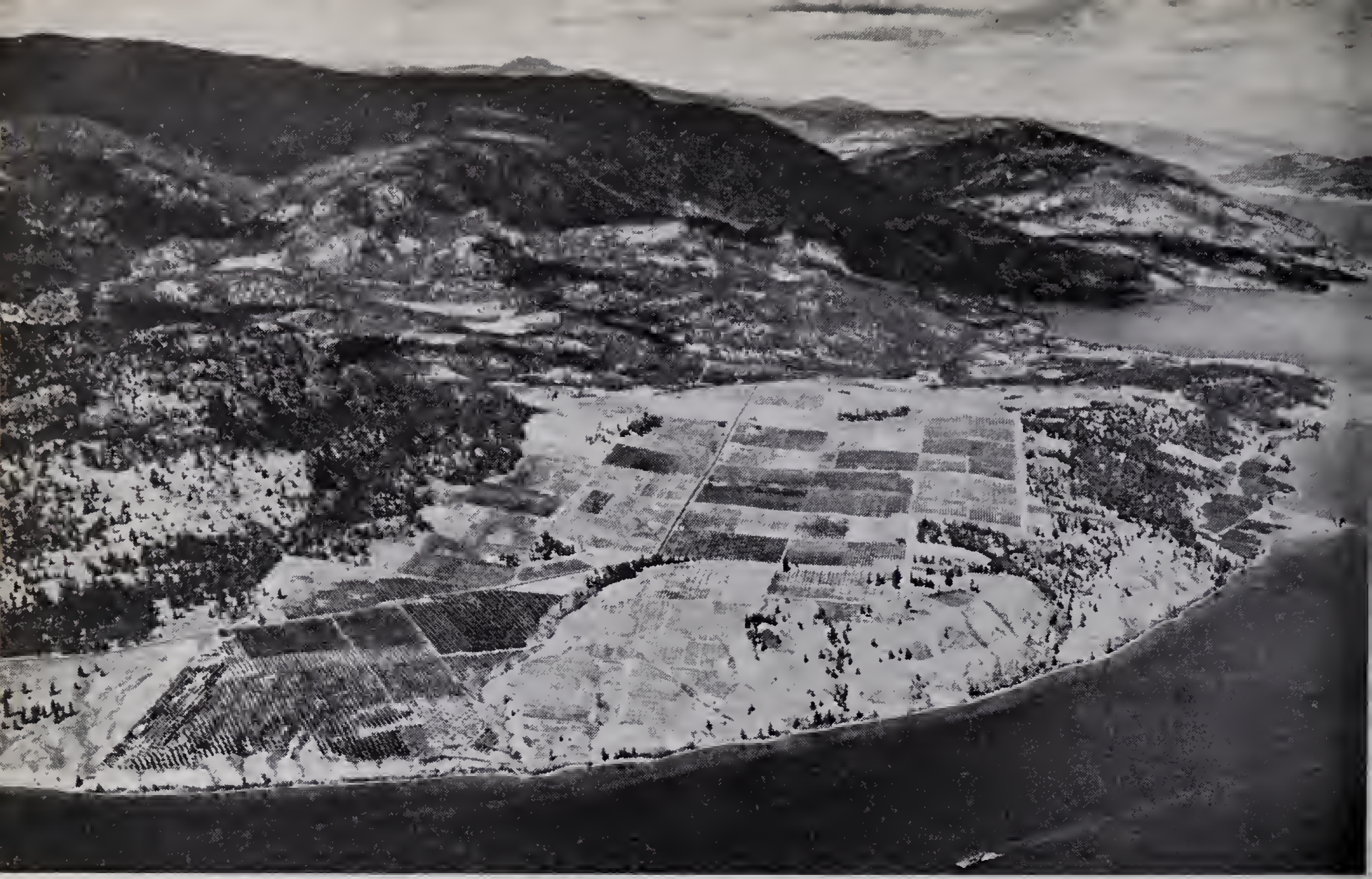
* Humus is a dark, fertile soil consisting of decayed animal and vegetable matter.



9—49 An aerial view of the shores of Lake Okanagan at Westbank (Canada Department of Agriculture photo)

(b) The orchards in this photograph, like Mr. Towgood's, require the equivalent of 40 inches of precipitation per year. What evidence is there that most of this must be supplied by irrigation?

(c) Study the land in the far distance. Describe the relief. Suggest reasons why it is mostly unoccupied. What natural resources might be available in this rugged country?

(d) Describe the limits of the cultivated orchardland as seen in this photograph. From the picture and from the map in Figure 9—48, make a general statement about the location and extent of cultivated land in the Okanagan Valley.

4. Figure 9—50 shows orchards near Penticton.

(a) What climatic advantage is there in the location of trees on sloping benchlands like these?

(b) Compare this photograph with that of Mr. White's orchard in Figure 2—11. Comment on the difference in relief between the two areas. In which one is fruit cultivation more intensive?

5. Review the climatic graph for Kamloops in Figure 9—44. Figures for the Okanagan Valley are similar. Oliver, for example, receives about 11 inches of precipitation per year. Summers here are warmer than those at Kamloops. The July average at Oliver is 75°F. Compare this figure with that for Victoria. Explain the difference. Compare it with that in your neighborhood. In 1958, a record high temperature of 111°F. was recorded at Oliver—one of the highest ever known in Canada.*

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*In spite of high summer temperatures, frost can be a serious problem during the spring blossom period. A few degrees of frost can wipe out a farmer's entire crop. Okanagan radio stations maintain a frost-warning service. Farmers place "smudge pots" of oil between trees on cool nights. As these burn, temperatures are maintained sufficiently high to prevent tree damage.

9—50 Orchards near Penticton (British Columbia Government photo)

Here is an account of peach harvesting near Osoyoos, written by two college students who worked there:

> "After breakfast, we helped the farmer load empty boxes in the trailer hitched to his tractor. We dropped them in piles by the peach trees. We then put on our picking bags and carried our ladders into the orchard. The sky was blue and clear, but after two hours of picking, we noticed that the straps of the picking bags began to cut into our shoulders. By noon, we were hot, sore, itchy and very hungry. It was a relief to go to the farmhouse for a tempting dinner and a cool drink. The afternoon was very long and very, very hot. It would have been such a relief to lie stretched out under a tree for a rest. Finally, five o'clock arrived and so ended our eight-hour day, picking peaches in the full heat of a south Okanagan day. Our legs were aching and our arms were sore. After dinner, we relaxed and looked over the beautiful valley. The contrast between the clean, brown, bare hills and the rich green, irrigated orchardland made us wonder what this land was like before man cultivated it. The farmer was not able to enjoy the view, for he was still busy in the orchard with his tractor and trailer picking up boxes of peaches, which were collected by a packinghouse truck later in the evening. His final chore was changing his sprinklers.*

Peaches and cherries have been mentioned as crops that grow around Osoyoos and Oliver. Apricots, plums, pears, cantaloupe, melons, and small fruits are also raised there. Further north, around Penticton, the same are grown. Kelowna has a central position in the Okanagan Valley and raises apples, cherries, plums, and small fruits. Locate Vernon in Figure 9-48. This is the main centre of the British Columbia apple industry. The largest irrigation system in the province exists at Vernon, with 9000 acres "under the ditch." The Okanagan

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*This material is an extract from a study prepared in 1961 by Jean Fekete, Charmion Westphal, Norma Selig, Carolyn Geisler, Irwin Van Vorst, and John Briscall, students in the College of Education, University of British Columbia.

Valley and the adjacent Similkameen Valley contain 90 percent of all the tree-fruit acreage of British Columbia. There were 3365 registered growers in 1962. In 1960, the numbers of trees of each kind of fruit in these valleys and in the Kootenay region to the east were as follows:

Apples	1,299,483
Pears	389,533
Peaches	326,750
Apricots	143,928
Cherries	179,514
Prunes	109,175
Plums	4,937

The output is sold in fresh, frozen, and canned form. It is shipped out of the province by trailer-truck and rail, using refrigerated equipment for fresh and frozen fruit. Where are the chief markets for Okanagan fruit? As the local market is too small to absorb the crop, efficient outside marketing arrangements are essential. There is a large market for canned and frozen juice. The harvesting, packing, storage, processing, and marketing of fruit provide employment to hundreds of people. Nearly every town has some of the facilities (storage plants, canneries, etc.) associated with these activities. The sale and servicing of orchard equipment is an important business. A typical 10-to-20-acre orchard requires a tractor, a light trailer, a mower, a sprayer, cultivation and irrigation equipment, and ladders.

Fruit and vegetable cash crops account for nearly one third of the acreage and more than one half the farm income of the Valley. Fodder crops occupy more acreage than fruit and are closely associated with stock raising. Large numbers of dairy cattle and poultry meet local needs. Beef cattle and sheep are raised on ranches on the margins of the Valley. The Princeton area to the west is a southward extension of the ranching country in which Douglas Lake is located.

As in the Kamloops district, logging and wood-processing (especially sawmilling) are more important than agriculture in terms of income. Fir (especially interior Douglas fir) accounts for more than half the annual cut. Yellow pine, Engelmann spruce, larch, hemlock, and red cedar are other trees of importance. The largest sawmill is at Kelowna where a plywood plant is also located. Unlike the coast forest areas, the Okanagan Valley is the home of the small logging operator. Few mills are larger than that shown near Vernon, in Figure 9-51. Compare the logs in the foreground with those cut on

9—51 A sawmill at Lumby near Vernon

the coast. Most Okanagan lumber is marketed on the Prairies, in eastern Canada, in the United States, and overseas.

The chief mineral deposits of the Southern Interior consist of the copper ores already mentioned. No minerals of major importance lie within the Okanagan Valley. Likewise, there are no important hydro-electric developments, but important installations in the Kootenay region to the east serve the area. Oil and natural gas supply fuel for thermal plants. At Westbank, for example, a diesel-fueled electric-power plant produces power for local use.

Penticton is the largest city in the Southern Interior. Describe its location, according to Figure 9-48. Nearly 2500 acres of orchard lie within the city limits. Penticton is a major packing, processing, and distributing centre for the fruit industry. It is also the main hub of transportation for the South Okanagan. Which routes meet at or near the city, according to Figure 9-48? Lack of a rail connection between Penticton and Kelowna is a handicap to regional development, although the growth of the trucking industry has largely overcome this. Penticton has a beautiful location, with a fine sandy beach on Okanagan Lake. These factors and an extremely pleasant climate make it one of the largest tourist centres in the province. It is a service and supply centre for smaller settlements such as Princeton to the west and Grand Forks and Greenwood to the east.

Kelowna, with 13,188 people in 1961, is only slightly smaller than Penticton. Including surrounding villages, the district contains nearly 30,000 people. It is the headquarters of British Columbia Tree Fruits Limited and has various industries related to fruit growing, such as a winery, using local grapes. Which important enterprises, based on local forest resources, are located at Kelowna? Like Penticton, the "heart of the Okanagan" is a leading tourist centre.

Vernon has the largest fruit-packing house in the British Commonwealth. As elsewhere in the Okanagan Valley, logging is important. There are 112 sawmills within a 75-mile radius of Vernon. The city is a supply and service centre for villages such as Armstrong and Enderby, to the north. Vernon, incorporated in 1892, is the oldest city in the interior of the province.

A backward glance at the Southern Interior

1. Look at the population map again in Figure 9—1. What is most noticeable about the distribution of people in the Southern Interior? What are the chief natural factors limiting the distribution?
2. Describe the various ways the land is used in the Southern Interior. Make a list of the industries and occupations associated with the various uses of the land.
3. Describe the various ways in which the Southern Interior is linked with the outside world. Why are these links vital to the growth of the region? Think of some activities that are directly dependent on such links.
4. Most of the Southern Interior is unpopulated. Describe briefly what the unpopulated areas look like. Why are they likely to remain unsettled?

THE CENTRAL AND NORTHERN INTERIOR

No strict boundary separates this region from the Southern Interior. Around Williams Lake, near latitude 52°N., the land becomes more rolling than hilly and general elevations are lower than in the Southern Interior. This is the heart of the Cariboo ranching country and serves to separate the Southern Interior from the region to the north. Between Williams Lake and Prince George are some of the largest cattle ranches in the province. Few boys and girls in Canada live lonelier lives than those who live on the farms and in the tiny settlements of this district. The restoration of Barkerville, which was the centre of mining in the gold rush days, is bringing many tourists to the area. But there, as everywhere in the interior of British Columbia nowadays, it is the logger who is bringing about the greatest changes. Prince George is the centre of the most productive forest district of the interior. There, the rolling nature of the relief and a dense forest cover make logging easy. Since 1945, many new sawmills have been opened there and vast quantities of processed lumber are shipped out. Prince George is in a splendid position for trade. Figure 9-61 and a good atlas or road map will illustrate this. Which transcontinental railway line passes through the city? With which Pacific port does it connect Prince George? How far is Vancouver from Prince George? Which railway line connects Prince George with Vancouver? The same line extends into the Peace

River District. Name the highways that converge at Prince George. Describe the route that would be followed on an automobile trip from Vancouver to Prince George. The city also has an important airport. Oil and gas pipelines from the Peace River District pass through Prince George and provide convenient sources of power for local industries.

Prince George is the centre of a farming district that is similar to the "Pioneer Fringe" of the Prairie Provinces. There is a great deal of level land on old lake bottoms, with good-quality dark soils. Mixed farming is the rule, with vegetables and fodder crops of greatest importance. Hay occupies half the acreage sown. Livestock are the main source of income. Cash crops include timothy hay and clover seed. The Canadian National Railways line west of Prince George serves most of the farms of the area.

The lack of a large local market is a handicap to agriculture. More serious is the short growing season. Prince George has severe winters (with a January average temperature of only 15°F.) and short summers. Between 1952 and 1956, the frost-free season varied from 68 to 96 days. Between 1920 and 1956, it averaged only 73 days. There is a considerable variation from place to place, depending on elevation, slope, nearness to water, and other factors. Farmers are wise if they rely on no more than 65 to 70 frost-free days. However, there is some promise that British Columbia's limited amount of cultivated land can be increased considerably by developing new farms in the Prince George district. Precipitation in the region averages 22 inches per year. It is quite heavy in the autumn and, since low temperatures reduce evaporation, harvest time is likely to be wet, which is an additional problem in the area.

North of Prince George lies a vast, mountainous, almost uninhabited region. Northern British Columbia lacks rail or road contacts with the outside world. No more than 5000 people inhabit a region comprising one third the area of the province. Mineral wealth is known to exist there and an asbestos deposit is being worked near the Yukon border.

THE PEACE RIVER DISTRICT

This region of British Columbia is an extension of that studied in Alberta, on pages 338-339. Review the material on those pages and state which crops you would expect to find growing in the Peace River District. Figure 9-52 shows an unusual scene for the mountain province. Describe the relief of this land. How is it being used? What type of climate would you expect to find there? Review the climatic

9—52 A grain field near Dawson Creek (British Columbia Government)

graph for Grande Prairie in Figure 8-10. Compare winter and summer temperatures in the Peace River District with those of the Southern Interior (for example, with Kamloops) and with those of coastal British Columbia (for example, Prince Rupert). Winter temperatures are even lower at Dawson Creek, where the January average is zero. As on the Alberta side, precipitation is generally adequate for crops, but farming is limited by a short growing season. However, the frost hazard is not as great as in many parts of the Central Interior. Long, sunny summer days help to compensate for the short season. Fort St. John, for example, gets 300 hours of bright sunshine in July. How does this compare with Vancouver? Suggest one reason why Fort St. John receives more sunshine than the latter city.

The extension of the Hart Highway and the Pacific Great Eastern Railway from Prince George to Dawson Creek and Fort St. John respectively has linked the Peace River District (including the Albert side) with Vancouver. This is especially important where grain is concerned, since Vancouver is now Canada's greatest exporter of that crop.

The transportation links of the Peace River District

1. The Pacific Great Eastern Railway, owned by the British Columbia Government, is one of the most remarkable in Canada. Refer to Figure 9—61.
(a) Where is its southern terminus?
(b) Where is its northern terminus?
(c) Estimate the rail mileage between these two places.
2. Study the following timetable of a rail journey between Vancouver and Dawson Creek:

Leave Vancouver	Wed.	8:30 a.m.
Arrive Prince George	Wed.	10:30 p.m. (Overnight stop)
Leave Prince George	Thurs.	8:40 a.m.
Arrive Dawson Creek	Thurs.	7:30 p.m.

(a) Not counting the overnight stop at Prince George, how many hours does the train take to make the journey from Vancouver to Dawson Creek?
(b) List the important towns through which the train passes on the journey.
(c) Describe what the land looks like in the neighborhood of each of these

places: Lillooet, Williams Lake, Prince George, Dawson Creek. Refer where possible to photographs in the chapter to assist in answering this question.

3. (a) In which direction from Dawson Creek does Edmonton lie? What is the distance between these cities?
(b) Where is Dawson Creek located in relation to the Peace River?
(c) How many miles (and in which direction) is Fort St. John from Dawson Creek? Locate the village of Taylor.

In 1951, Dawson Creek had a population of 3589 people. By 1961, the population had tripled to 10,946. Fort St. John has also had a rapid growth. Most of this has been the result of important oil and gas discoveries. The Peace River District accounts for most of British Columbia's production of these minerals. Locate the oil and gas pipelines in Figure 9-60. Where is their terminus? Taylor, near Fort St. John, has developed a major petrochemical industry. The growth of these communities has been so rapid that "trailer towns" have grown up on the edge of all of them. People have also been attracted by the possibility of work on the Peace River Power Project, plans for which have been drawn up by the British Columbia Government. They include the building of a reservoir on the Finlay River, a tributary of the Peace. A dam and powerhouse and a second, smaller dam further downstream at the foot of the Peace Canyon would generate huge amounts of electricity. This could be transmitted as far away as Vancouver. It would also be available to local industry. In 1962, final plans for this gigantic project were still being drawn up.

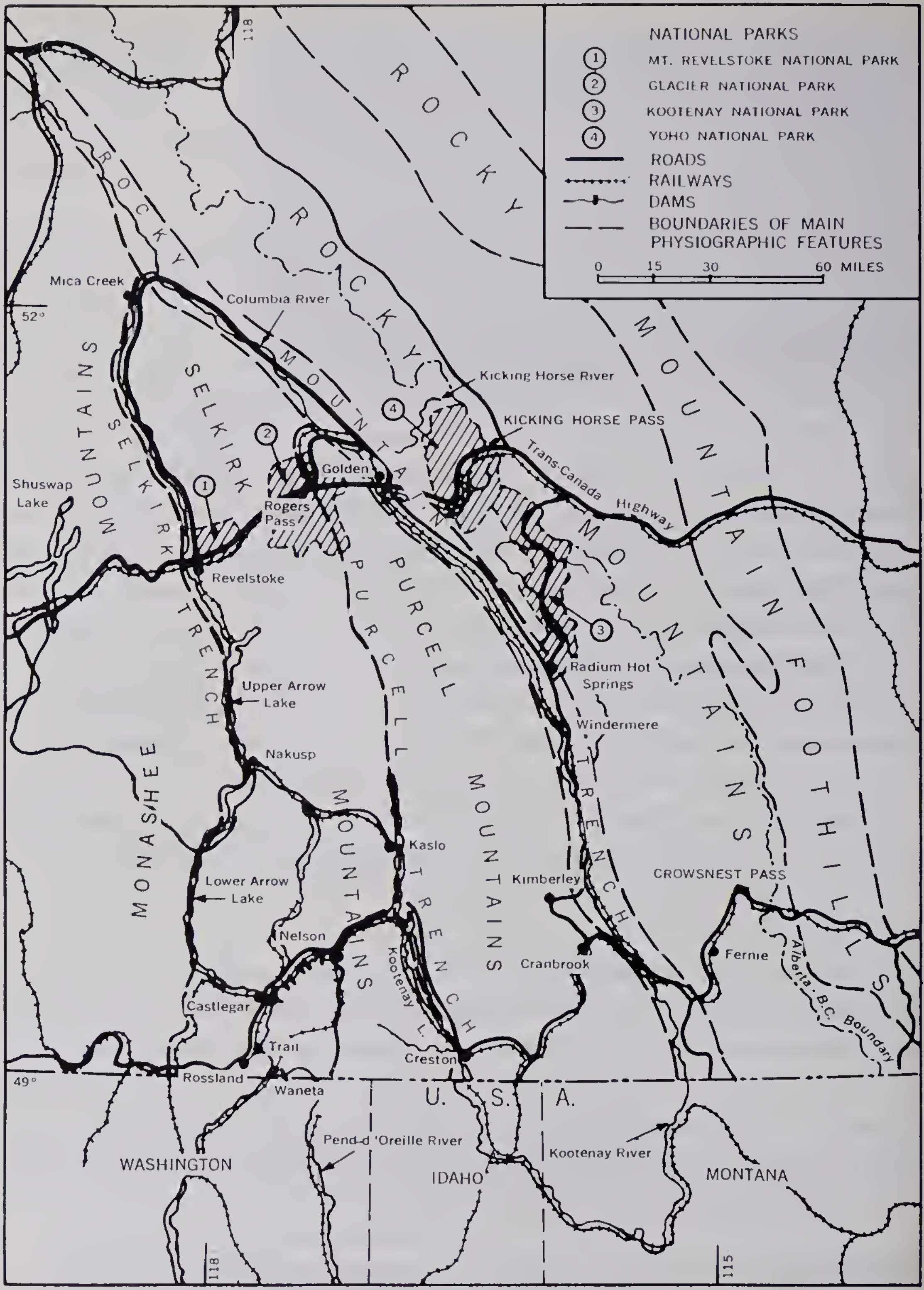
SOUTHEASTERN BRITISH COLUMBIA

This region is also called the Kootenay or, more accurately, Kootenay-Columbia Region, after the two great rivers that drain it. The limits of Southeastern British Columbia are shown in Figure 9-53. For our purposes, it can be considered as the area extending from 49°N. to about 52°N. Its eastern limit is the Alberta border, which follows the height of land of the Rocky Mountains. Which mountain range forms the western limit of the Kootenay area?

The mountain and valley character of Southeastern British Columbia

1. The photograph in Figure 9—54 was taken north of Creston. Locate Creston in Figure 9—53.
(a) Which river appears in the photograph?
(b) Into which lake does the river flow?

2. The valleys of Southeastern British Columbia are often referred to as "trenches."
(a) Why is "trench" a good term, according to Figure 9—54?
(b) Describe the floor of the trench shown in the photograph.
(c) State the main forms of land use in the trench.
(d) Identify the mountain ranges in the photograph by reference to the map.



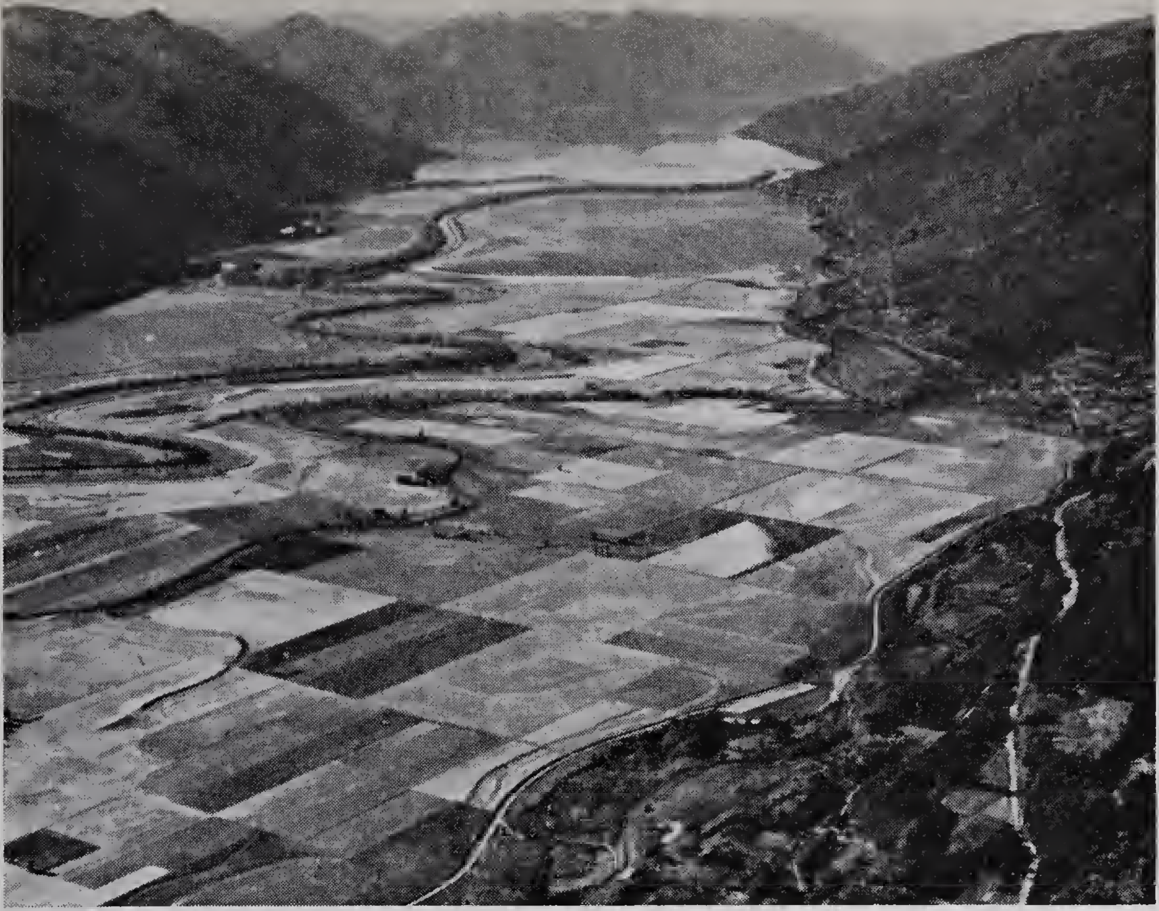
9—53 The Kootenay area

3. Figure 9—55 shows the town of Revelstoke in the foreground. It is located in the Selkirk Trench.

(a) Refer to Figure 9—53 and state on which river Revelstoke is situated.

(b) The mountains in the background are the Monashee Range. In which direction do they lie from Revelstoke? On which bank of the Columbia River is Revelstoke located?

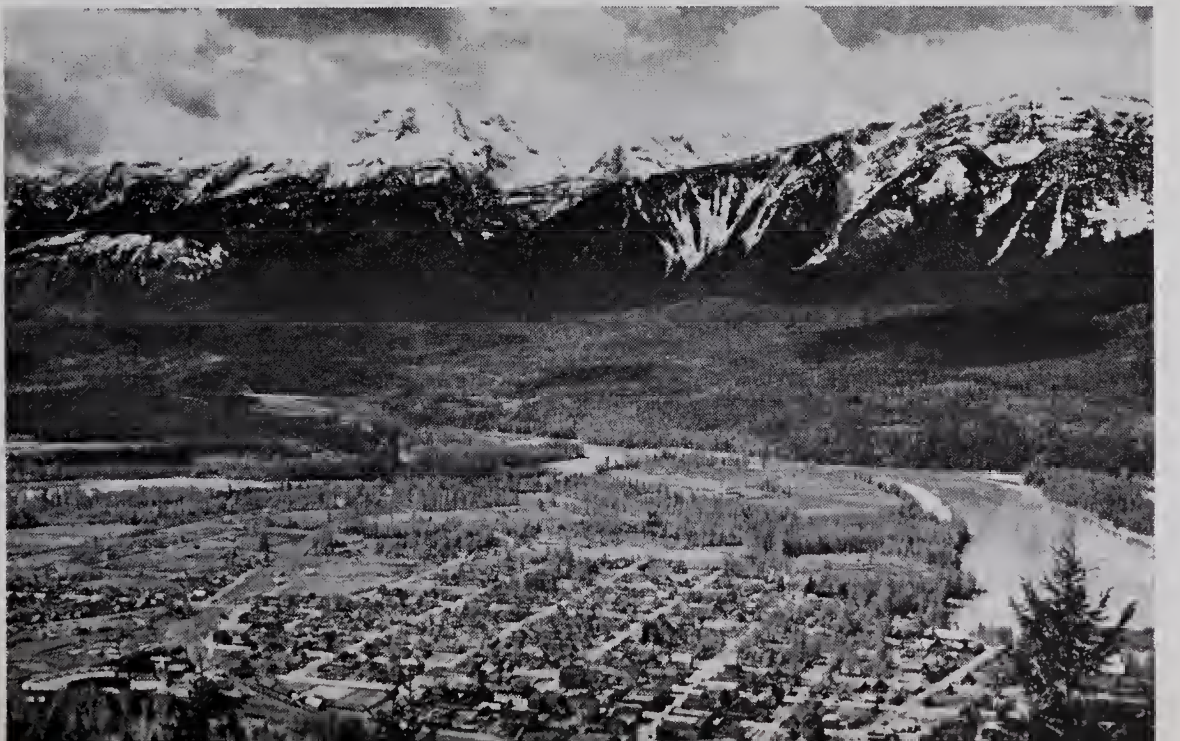
(c) Describe the nature of the Monashee Mountains.



9—54 A scene in the Purcell Trench north of Creston (National Film Board photo)

Southeastern British Columbia has abundant hydro-electric power resources. Logging and tourism are among the main industries. What evidence for these statements is supplied by the photographs just studied? Figure 9-53 shows the various mountain ranges that make up the Kootenay area. The Rocky Mountains are the largest, highest, and best known of these ranges. Review pages 340-345 in Chapter 8 and note again the major characteristics of the Rocky Mountain district. Which passes in this range link Alberta with British Columbia? Name the main transportation routes that use these passes.

9—55 A view of Revelstoke, showing the Monashee Mountains in the distance (Canadian Government Travel Bureau photo)



The mountain ranges lying west of the Rockies — the Purcells, Selkirks, and Monashees — form a system often called the Columbia Mountains. They are older than the Rocky Mountains and consist of different rock structures. However, as Figure 9-55 shows, they approximate to the height of the Rockies in many cases. Generally, they range from 6000 to 9000 feet in elevation, but a few peaks exceed 10,000 feet. These ranges are separated from the Rocky Mountains by the Rocky Mountain Trench, the largest of the valleys of Southeastern British Columbia. Ranging in width from two to ten miles, this great trough extends from Montana in the United States to the Yukon border. Note how it stands out in Figure 9-2.

Several great Canadian rivers rise in the Rocky Mountain Trench. Two of these rivers — the Columbia and the Kootenay — occupy the other trenches already named. In their courses towards the southern part of the region, they widen into beautiful lakes, which form some of the finest scenery in the Kootenays. Note these lakes in Figure 9-53. The trenches contain most of the people and the cultivated land of Southeastern British Columbia. How is this concentration of population evident from the maps in Figures 9-1 and 9-53?

Figure 9-55 suggests that the mountains of Southeastern British Columbia are heavily wooded. About 40 percent of the forested area of the region consists of Douglas fir. White pine, lodgepole pine, white spruce, Engelmann spruce, balsam fir, and hemlock are the other species cut. Of these, Douglas fir accounts for about 25 percent of the output. More than 3000 men are employed in the woods and in mills that produce mainly sawn and planed lumber. A pulp mill was opened at Castlegar in 1961 and uses the poorer logs and sawmill wastes. Mine props, poles, railway ties, and Christmas trees are other products of the important logging industry.

How many national parks exist in the Kootenay area, according to Figure 9-53? Yoho Park is possibly the most famous of these. The word is an Indian term meaning "it is wonderful" — a very good description of the fine mountain scenery of this part of British Columbia. In addition to the national parks, there are 26 provincial parks. The region is one of the finest big game areas left in North America. Black and grizzly bears, moose, elk, deer, mountain goats, bighorn sheep, and cougars attract many hunters. Fish are also plentiful. Winter sports attract thousands of visitors every year.

The mountains of Southeastern British Columbia have provided serious transportation difficulties for many years. David Thompson was probably the first white man to visit the area, during the period

1807-1812. He was searching for a fur trading route through the mountains. He became the first man to explore the Columbia River to its mouth, but the route he found was not a practical one. Later in the nineteenth century, gold discoveries led to the opening, in 1864, of the Dewdney Trail, from Hope to a point just east of Kimberley. During the period 1880 to 1885, the Canadian Pacific Railway was built through the region. Revelstoke and Golden were founded as a result and are among the oldest settlements in the Kootenays.

In 1962, Southeastern British Columbia finally received a first-class road link with the rest of Canada, and an improved connection with Southwestern British Columbia. This was the result of the opening of the Trans-Canada Highway. Formerly, the highway was forced to follow the "Big Bend" of the Columbia River, a detour, on a difficult mountain road, of more than 100 miles. The new road uses Rogers Pass to cross the Selkirk Mountains. The road through the pass is 92 miles long and took five years to build, at a cost of 40,000,000 dollars. One of the great problems that had to be overcome was protection of the road against avalanches. Originally, the Canadian Pacific Railway used this route, but avalanches forced the line to switch its tracks from the pass and to burrow under it. This was the reason for the construction of the five-mile Connaught Tunnel in 1916. The snow problem is indicated by the fact that the average annual fall at Glacier, near the summit of the pass, is 342 inches. During the winter of 1953-54, nearly 650 inches of snow fell.

Various methods are being used to control avalanches. Figure 9-56 shows one of a series of eight snow sheds along the road. These sheds are made of concrete, and total more than seven miles in length, with an average width of 54 feet, that includes roadways in each direction. During the winter, Canadian Army artillery men shell accumulations of snow with guns mounted at 18 different points along the highway. In other places, fences have been built and earth "dams" constructed

9—56 A snow shed on Rogers Pass (British Columbia Government photo) to divert the snow. Above some of the snowsheds, the slopes have been levelled off to form benches where avalanches can be "caught." Finally, cone-shaped mounds of earth, each 12 to 25 feet high, have been built in double or triple rows to act as brakes in the flat sections of avalanche paths. In spite of all these measures, it is expected that storms will force the closure of Rogers Pass for at least a few days in most winters.

The opening of the road has greatly increased traffic through Revelstoke and other centres on the Trans-Canada Highway. Many new motels and hotels have been built. The tourist business has grown rapidly, as thousands of visitors have been attracted to the magnificent scenery of the national parks in the area. Driving time between Golden and Revelstoke has been reduced from seven to two hours.

Mining has been the chief source of wealth in the history of Southeastern British Columbia. The gold discoveries of the 1860s have already been mentioned. During the period 1890 to 1900, the first great mining boom occurred in the region. This took place near Slocan where lead-silver-zinc ores were found. Within a few decades, the best ores were exhausted and, with the decline of silver and lead prices, several small settlements became ghost towns. During the 1890s Rossland, just east of Trail, was also born, as a centre of gold and copper mining. By 1895 almost 2000 claims had been staked in the vicinity. The early Rossland mines were severely handicapped by having to ship their ore to Montana for treatment. To overcome this, a small copper smelter was built at Trail. By 1896 a railway linked Trail with the Rossland mine.

Today, the Kootenay area acounts for about half of British Columbia's mineral output. Most of this is produced at Kimberley where the famous Sullivan mine is one of the world's largest producers of lead and zinc. In addition, silver, tungsten, gypsum, barite, and some iron ore are produced. The "waste" from the lead-zinc ores has been found to contain 60 percent iron. An iron and steel smelter is under construction at Kimberley. This will include an electrically-operated unit and, at a later stage, the first blast furnace in British Columbia. Coal is mined near Fernie. Altogether, 2800 miners are employed. Nearly twice that number are employed, mainly at Trail, in various stages of processing the ore.

Trail — major industrial centre of the interior (Figures 9—57, 9—58, 9—59)

1. (a) Study the photograph and describe the general site of Trail.

(b) Refer to the map and state on which side of the Columbia River the main part of Trail is located.

(c) What is the general elevation of the city?
(d) Why will it be difficult for Trail to grow and expand in the future?
(e) What do you notice about the routes followed by the roads and railways?
2. The smelting and refining of metals is the chief industry at Trail.
(a) What evidence of this industry may be seen in the photograph?
(b) On which bank of the Columbia River is this industry located?
(c) Trail's main industry uses large quantities of hydro-electric power. Most of this power comes from seven plants within 50 miles of Trail. Locate these plants in Figure 9—53. On which rivers are they located?
(d) Most of the ores processed at Trail are brought from Kimberley. Estimate the distance they must be transported to Trail. What means of transportation is used?
3. The climatic graph of Trail (Figure 9—59) illustrates several features of the climate of Southeastern British Columbia.
(a) Compare winter temperatures here with those at Kamloops and Ladner.
(b) Compare summer temperatures at the three places concerned.
(c) Compare the total precipitation at Trail with that at Kamloops. Explain why precipitation increases as one leaves the dry interior and travels eastward toward the mountains.
(d) The climate at Trail is fairly typical of the **settled** areas of Southeastern British Columbia. Why are there great variations throughout the unsettled parts of the region?

British Columbia's importance as a producer of Canadian lead and zinc is evident in the following figures for 1958, showing the dollar value of these minerals:

	Lead	*Zinc*
British Columbia Production	$33.5 million	$47.3 million
Total Canadian Production	$42.5 million	$92.6 million

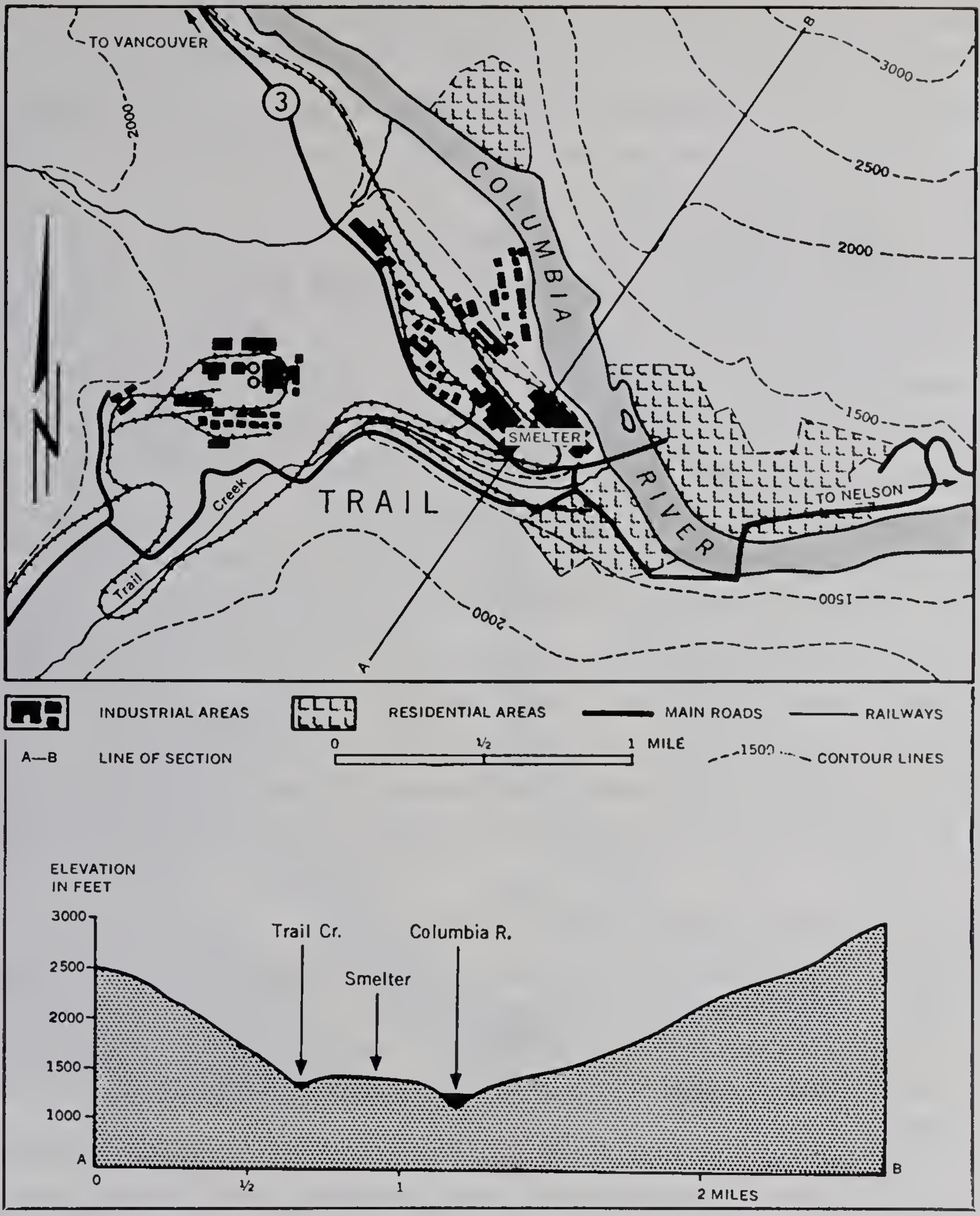
What proportion of Canadian lead production was accounted for by British Columbia in 1958? What proportion of Canadian zinc production was accounted for by British Columbia in the same year?

Lead-zinc ores have made Kimberley the chief mining centre of the province. They have made Trail, with nearly 12,000 people, the largest city of Southeastern British Columbia. The smelter-refinery shown in Figure 9-57 is one of the largest in the world. Fertilizers and chemicals (such as sulphuric acid) are manufactured at Trail.

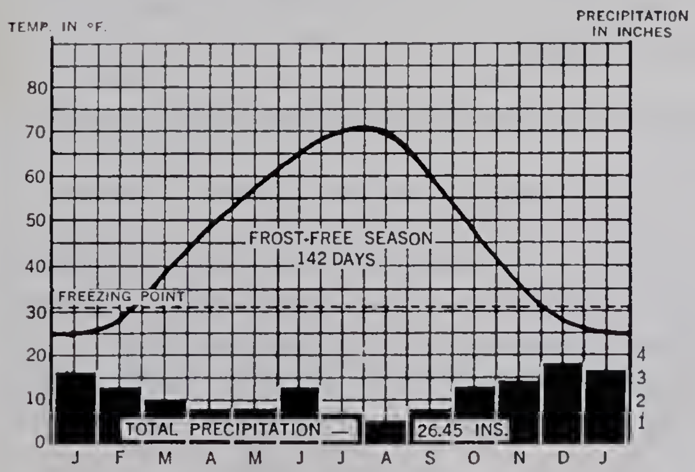
Smelting and refining require vast quantities of hydro-electric power. The plants supplying Trail have been noted in Figure 9-53. Together, they comprise one of the two main sources of developed water power in the province. Most of the output serves the industries at Trail and provides power to Kimberley, Nelson, Castlegar, and other communities in the region. There are great undeveloped reserves of water power on the Columbia and Kootenay rivers. Plans exist for the construction of three large dams. These plans depend on co-operation between Canada and the United States. All power

9—57 An aerial view of Trail, chief industrial centre of the B.C. interior (Consolidated Mining and Smelting Co. of Canada Ltd. photo)

generated would be produced south of the international boundary. Since the water needed to produce this power is found on the Canadian side and would be stored there, Canada is entitled to half the output of electricity from the Columbia River Project. The governments of Canada and British Columbia have had difficulty agreeing on what to do with this power. Some people believe that it should be sold in the United States and the money used to develop power projects, such as that on the Peace River, in British Columbia. Others claim that Canada would be selling a valuable natural resource which could not be recovered should it be needed later. Residents of the Kootenay region have been concerned because, no matter which course is followed, valuable farmland will be flooded by the Columbia River Project. In an area where there is so little level land, this is a serious problem.



9—58 A large-scale map and profile of Trail



9—59 Climatic graph of Trail

Other sources of power are easily available to Southeastern British Columbia. The coal mines at Fernie have made possible some thermal-electric power development. Oil and natural gas are easily brought in from Alberta. No part of the province is supplied with a greater variety of power resources.

The region contains about 100,000 people. They live in an area that comprises about 30,000 square miles, or eight percent of the area of British Columbia. Nearly all live in the narrow valleys or trenches, in the towns that we have already noted. As Figure 9-54 shows, these trenches are also the site of most of the agricultural land. About two thirds of the farm income is derived from livestock, mainly beef cattle and poultry. The remaining one third is derived from cash crops, especially in and around Creston. Much of the farmland shown in Figure 9-54 consists of reclaimed "flats." Here, wheat, oats, barley, peas (for seed), and alfalfa seed provide the main crops. Creston is also the centre of the province's second-ranking area of tree-fruit production. Apples and cherries are the chief crops.

Truck gardening is carried on around Creston, Cranbrook, Trail, and Nelson. This industry supplies vegetables for local consumption.

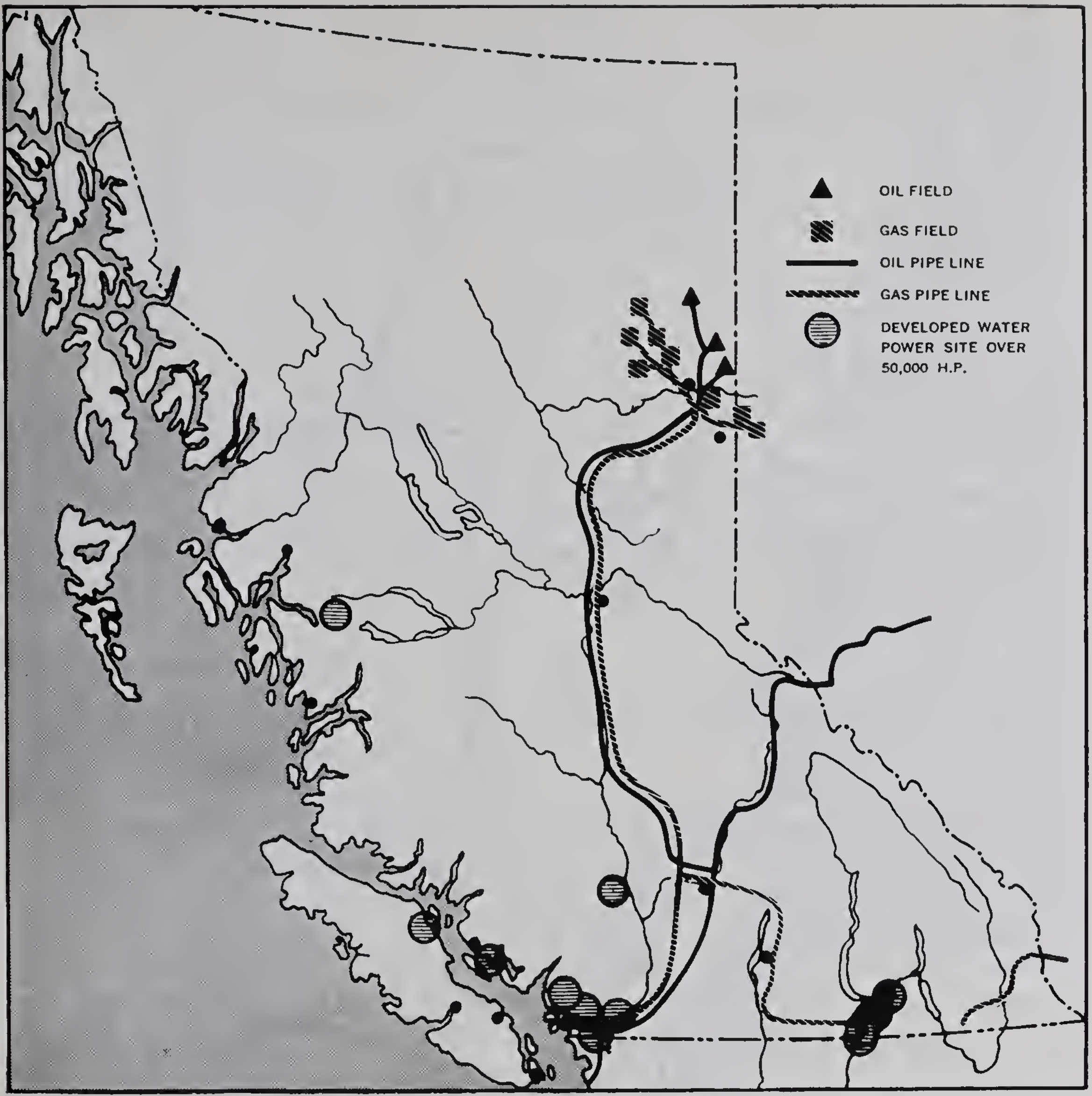
Reviewing Southeastern British Columbia

1. Make a list of the main geographical characteristics of the region. In what ways does it differ from the Southern Interior?
2. Suggest some reasons why Southeastern British Columbia may have a bright industrial future. What factors will probably always be a major handicap to the region's growth?
3. Suppose that you have been assigned to write a tourist folder, advertising the attractions of Southeastern British Columbia. What features would you emphasize? What advice would you give to tourists regarding various ways of reaching the region?

BRITISH COLUMBIA AS A WHOLE

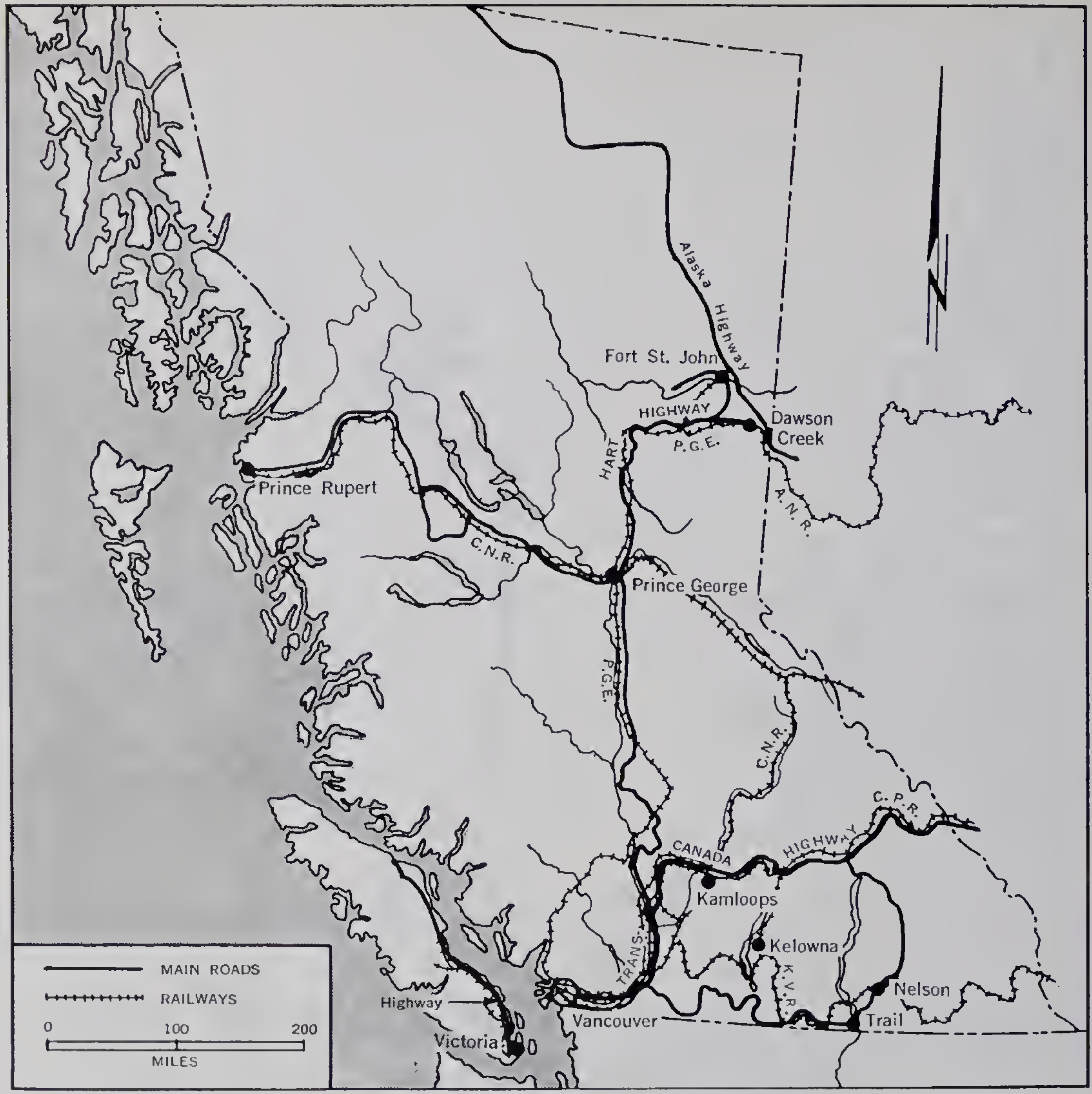
At the beginning of this chapter, some big questions were asked about the population map and the landforms map of British Columbia. The following may help to provide answers.

1. (a) What indication does Figure 9—36 give of the fact that British Columbia's greatest forests are on the coast?
(b) Suggest the importance of the forest products of British Columbia in Canada's total foreign trade.
2. In Figure 9—23, what indication is there that some areas of the province specialize in certain forms of agriculture. What accounts for such specialization in each area? What is British Columbia's chief agricultural export?
3. (a) In Figure 9—60, describe the location of the four largest concentrations of hydro-electric power in the province. In each case, indicate the main consumers of this power.



9—60 Chief sources of energy used in British Columbia

(b) What other forms of energy are available to the homes and industries of British Columbia? Where are these forms of energy obtained?
(c) From your earlier studies, state the most important sources of mineral wealth other than gas and oil. Where are the chief markets for the minerals named?
4. (a) A wide range of manufactured goods must be brought into British Columbia from eastern Canada and from other countries. Why does the province not make more of its own manufactured goods?
(b) Why are the prices of some imported manufactured goods higher in British Columbia than in other provinces?
(c) Describe the main transportation links between British Columbia and the rest of Canada. See Figure 9—61.
(d) Name some products, exported abroad from the Prairie Provinces that pass through British Columbia. To which countries are they sent? Why are they exported via British Columbia?
5. The population of British Columbia increased by 100 percent between 1941 and 1961. Many were immigrants from overseas, but most came from other provinces.
(a) What factors have probably attracted people from other provinces, especially from the Prairies?



9—61 Transportation map of British Columbia

(b) Most Canadians of Asiatic origin live in British Columbia. How do you explain this fact?

6. Study the regional map in Figure 9—3 again. The population map will also be useful here.

(a) Which region contains nearly half the people of the province? How do you account for this dense population?

(b) Where are most of the people of Vancouver Island concentrated? Why is the west coast of the island so thinly populated? What are the chief sources of wealth in this region?

(c) "The Coast Mountains Region contains many good harbors, but only one important port." What is the difference between a harbor and a port? Name the only important port of the Coast Mountains Region. State reasons why most of the region remains undeveloped.

(d) Four interior regions have been identified on the map. State one or two important ways in which the interior as a whole differs from coastal British Columbia. State some ways in which the four interior regions differ from each other.

7. Why is the title of this chapter a suitable one? In what important ways does British Columbia differ from your home province?

CHAPTER 10

The Northwest Territories and the Yukon: Cold Lands and Few People

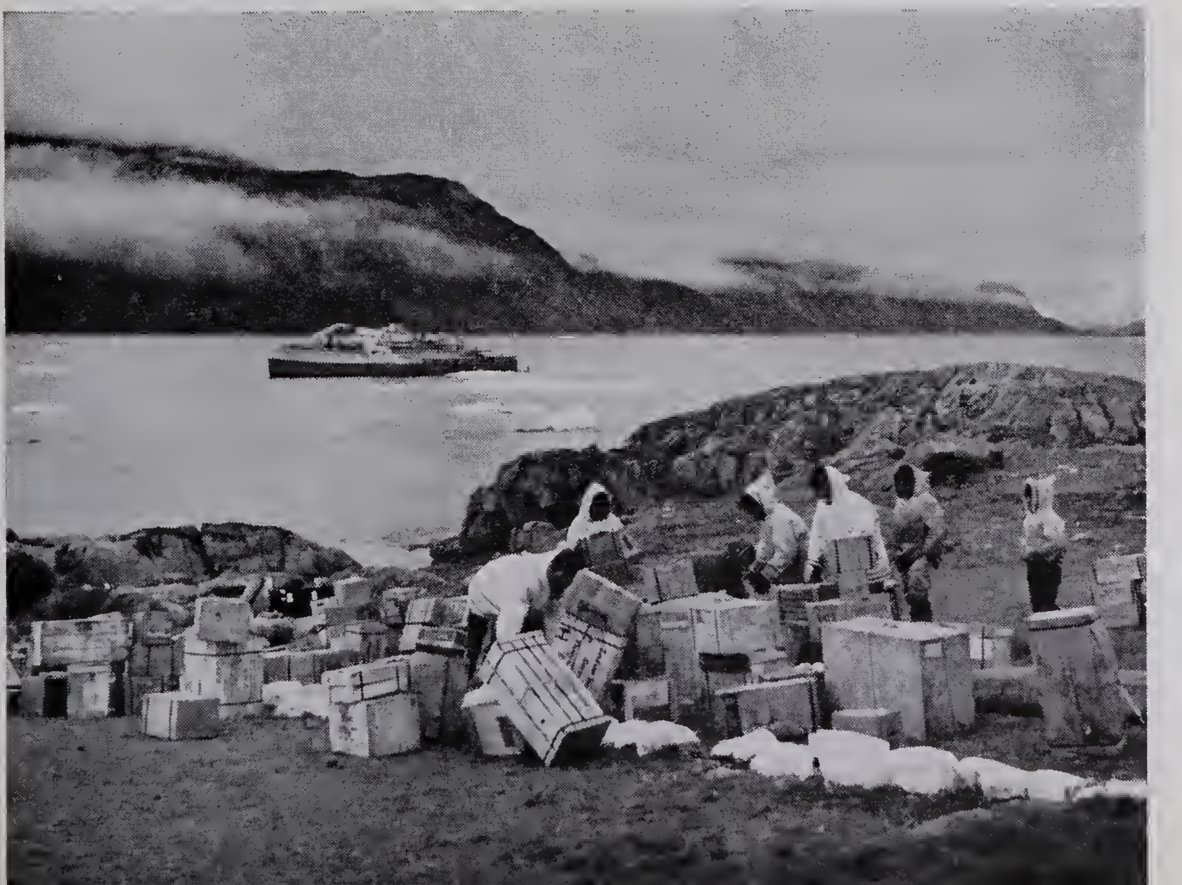
INTRODUCTION

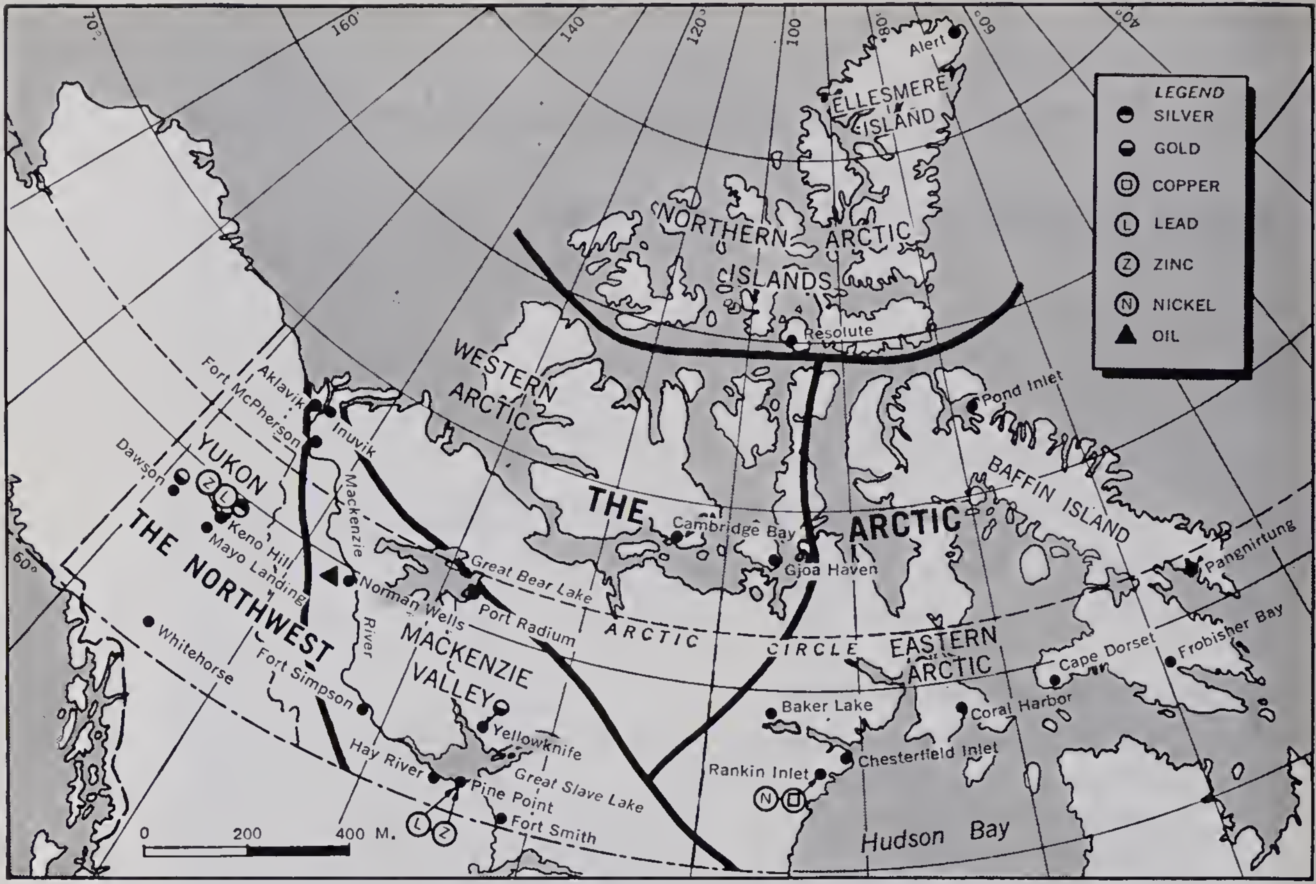
Figure 10-1 shows supplies being landed by barge from a ship at Pangnirtung on Baffin Island. Locate this settlement by referring to Figure 10-2.

Picture studies of the Northland

1. The picture was taken in summer, during the month of August. How can you tell that the Arctic summer is very cool?
2. The ship in the picture is the "C. D. Howe," which conducts the Eastern Arctic Patrol. It leaves Montreal around the end of June and is the only vessel to call at places such as Pangnirtung. How can you tell from the picture that the people receive supplies infrequently? Do many or few people live at Pangnirtung? Explain. In addition to landing supplies such as oil, food, and clothing, the Eastern Arctic Patrol has other work. Medical officers carry out a careful inspection of the health of the people of Pangnirtung. The officer in charge of the patrol visits every permanent resident to discuss problems and to explain government policies.

10—1 Supplies being landed by barge from the "C. D. Howe" at Pangnirtung on Baffin Island (National Film Board photo)





10—2 Regions of the Canadian Northland. This map also shows mineral resources. (after Professor J. L. Robinson)

3. Figure 10—3 shows a picture of the famous icebreaker "D'Iberville" which appears in Arctic waters during the brief ice break-up period. Most of the surface is covered by ice. How could this vessel assist the Eastern Arctic Patrol? The "C. D. Howe" is equipped with a helicopter which flies as much as 30 miles ahead of the ship to radio information to the captain about ice conditions.
4. Figure 10—4 was taken in a part of the Canadian Northland very different from Baffin Island. Locate Fort Smith, in Figure 10—2.
   (a) In which season was this picture taken?
   (b) What is the chief difference between the appearance of the land at Fort Smith and that at Pangnirtung?
   (c) At which centre — Fort Smith or Pangnirtung — would life be similar to that in many towns of Quebec or Ontario?

These studies have revealed some important facts about the Canadian Northland. The Arctic areas have very long winters and no real summer as we know it. No trees grow and the people lead lonely lives, receiving supplies once a year only. However, there are some wooded parts of the Northland where the summers, although still short, are surprisingly warm. Fort Smith, for example, once recorded a temperature of 103°F. on a hot, July day, a warmer temperature than has ever been recorded in Montreal, Ottawa, or Vancouver. Life at Fort Smith is similar to that in any small town in many parts of Quebec or Ontario.

10—3 The icebreaker "D'Iberville" steaming through Arctic waters (National Film Board photo)

Although Fort Smith has only about 1000 people, it is one of the biggest towns in the Canadian Northland.

It is startling to consider the densities of population there. In Prince Edward Island the density averages about 45 people to the square mile, but in the Northland, there is, on the average, only one person for every 40 square miles of land. Since most of the people are concentrated in a few towns and in several dozen smaller settlements,

10—4 A view of Fort Smith on the Slave River in the Northwest Territories (National Film Board photo)

there are vast areas, covering hundreds or even thousands of square miles, where no one lives at all. The Canadian Northland is one of the greatest empty areas of the world. Although its 1,511,979 square miles comprise nearly 40 percent of Canada's area, the Northland's 36,000 people give it a population no greater than that of a small Canadian city such as Guelph in Ontario, or New Westminster in British Columbia. In this chapter, we shall try to find out why so few people live in this vast region. Other questions we must try to answer are:—

1. What kinds of people live in the Canadian Northland and how do they earn a living there?
2. What special problems do great distances and a severe climate present to the people of the Canadian Northland?
3. Why is improved transportation the key to the future development of this region?
4. Why is the Canadian Northland important to Canada?
5. How will the region develop in the future?

For our purposes, we shall consider the areas north of Latitude 60° to be the Far North.* The Northwest Territories include the Arctic Islands which lie north of the Canadian mainland, and extend almost to the North Pole. Measure the distance from the northern tip of Ellesmere Island to Windsor, Ontario. Compare this with the distance from Halifax to Vancouver. How does Canada's north-south extent compare with its east-west extent? Because most Canadians live in the southern part of the land, within 200 miles of the United States border, we seldom realize how far north our country extends. Some islands, such as Baffin, are among the largest in the world.

Within the Northland, there are several different kinds of land, climate, and people. Two of the most important regions are called the Arctic and the Subarctic. Pangnirtung and Fort Smith each belong to one of these regions. The former is devoid of trees, while the latter is forested. Study Figure 10-5a and trace the northern limit of trees or the "tree-line" on this map. This line is probably the best means of dividing the Arctic from the Subarctic. It is a line that can actually be seen on the ground, where the forest ends and the *tundra*** begins. Another good way of dividing the two regions is to say that the Arctic consists of all those areas where the average temperature of

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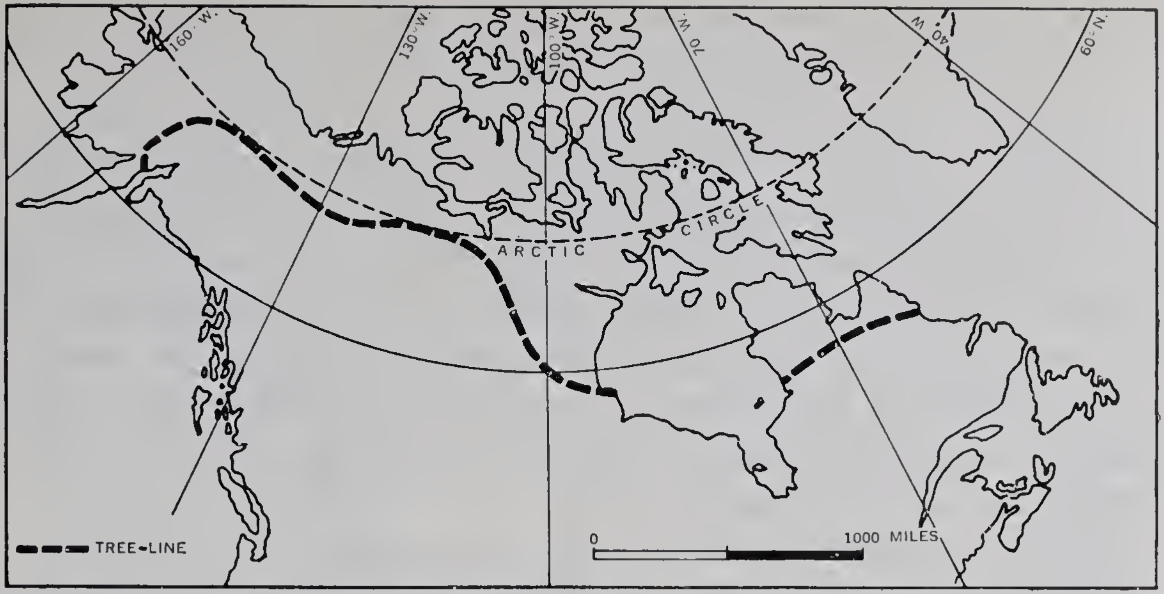
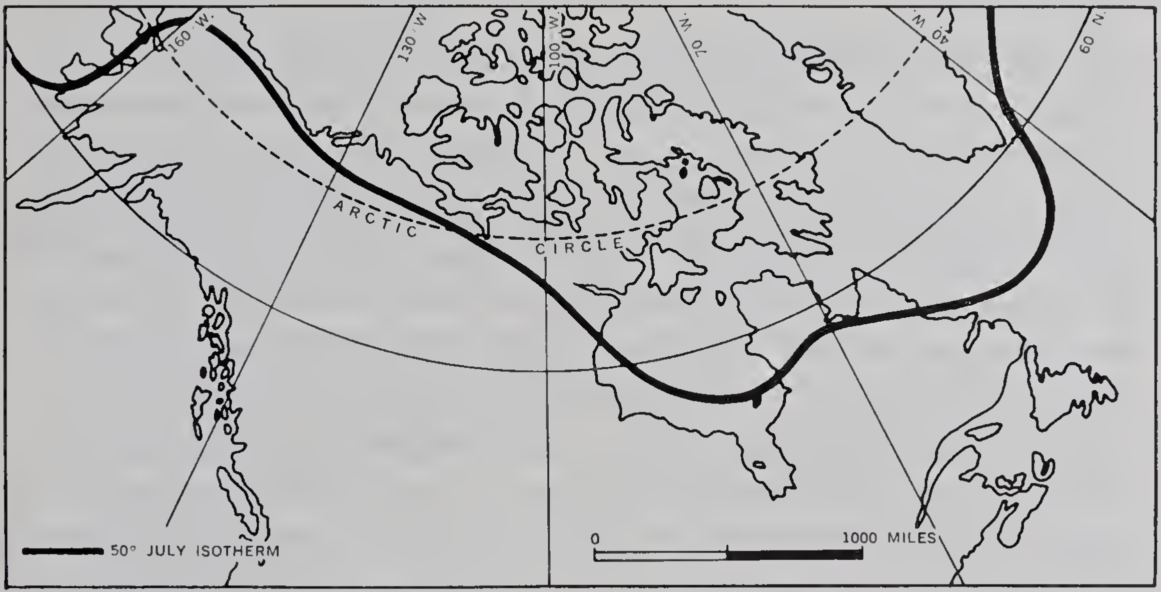
*These include small parts of Quebec and Labrador, which have already been studied. Then, too, some parts of most other provinces can be classified with the Northland. Climatic conditions at Kapuskasing, in Ontario, are very similar to those at Fort Smith.

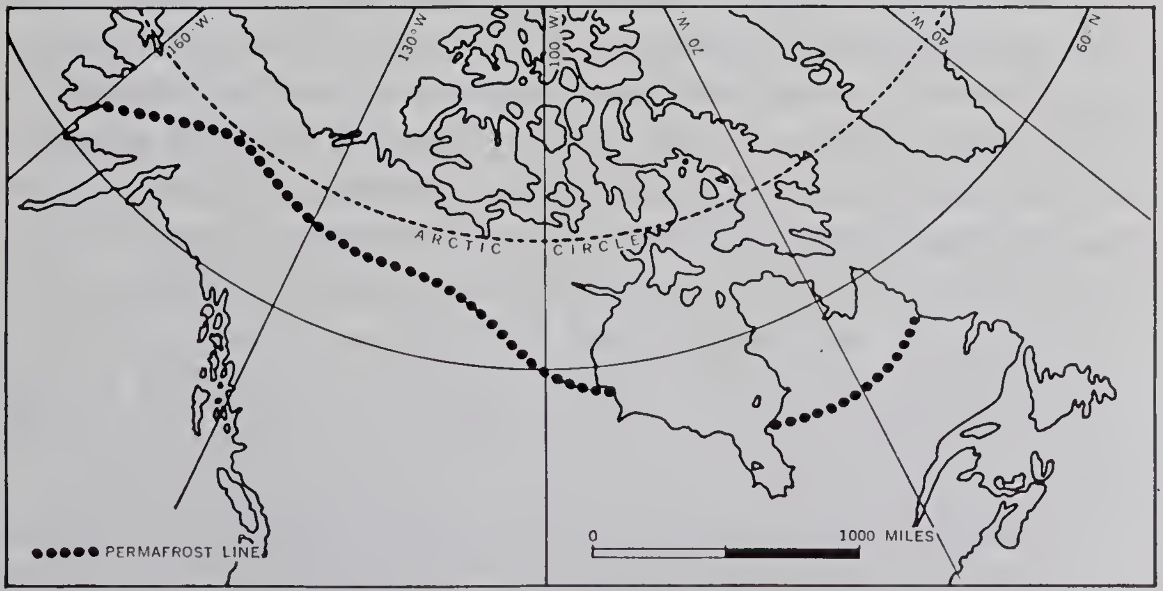
**Tundra is the name given to the vast, treeless northern region of the world where Arctic climate and forms of life are found.



10—5a The tree-line is the most widely accepted boundary of the Arctic.



10—5b The Arctic is often described as the area where the average temperature for the warmest month does not exceed 50°F.



10—5c North of the dotted line on this map the ground is frozen everywhere all the time, although the top or "active layer" may melt during the short summer.

the warmest month is less than 50°F. on the map in Figure 10-5b. Notice that it corresponds fairly closely to the tree-line.

Another important line is that showing the limit of continuous *permafrost*. Even in northern Ontario, there are areas where the ground is permanently frozen. However, in that part of Canada, such permafrost areas occur in patches only. Trace the permafrost line in Figure 10-5c. North of this line, the ground is frozen everywhere all the time. Only in a few places, for a few weeks during the summer does the shallow top layer of the soil thaw out. Below this "active layer," the ground is frozen to a depth of 1000 feet or more. In some places, the "soil" is 60 percent ice.

Many geographers divide the two great regions of the Arctic and the Subarctic into a number of smaller regions. These are shown in Figure 10-2.

THE EARLY EXPLORATION OF THE NORTHLAND

Explorers such as Hudson, Davis, Baffin, and Frobisher were venturing into the dangerous Arctic waters before Champlain reached Lake Huron and nearly two centuries before Captain Cook explored the coast of British Columbia. In your atlas find features commemorating the names of the four Arctic explorers just mentioned. These men were trying to find a Northwest Passage that would enable vessels to sail from the Atlantic to the Pacific oceans via the Arctic Ocean.

Later, Samuel Hearne explored the Coppermine River and Alexander Mackenzie followed the Mackenzie to its mouth. Meanwhile for nearly three centuries, other maritime explorers continued the search for a Northwest Passage, and in 1905 Amundsen, a Norwegian, found a route.

In 1942, the "St. Roch," a patrol ship belonging to the Royal Canadian Mounted Police, became the first vessel in history to make the passage through the Arctic Ocean from west to east. The experiences of the captain and seven-man crew of this small ship have provided much information about ice and climate conditions in Arctic waters. The "St. Roch" took two years and four months to make the trip from Vancouver to Halifax. Trace her route on the map in Figure 10-6. At Walker Bay, on Victoria Island, the ship was frozen into the ice for ten months. After the "St. Roch" fought her way out of the ice she headed into uncharted waters where the conditions have been described by the captain, Henry Larsen, in the following words:*

> We picked our way very slowly. It was dirty weather all the way to Gjoa Haven. We had to lay over three days at Gjoa because of the weather. When we moved

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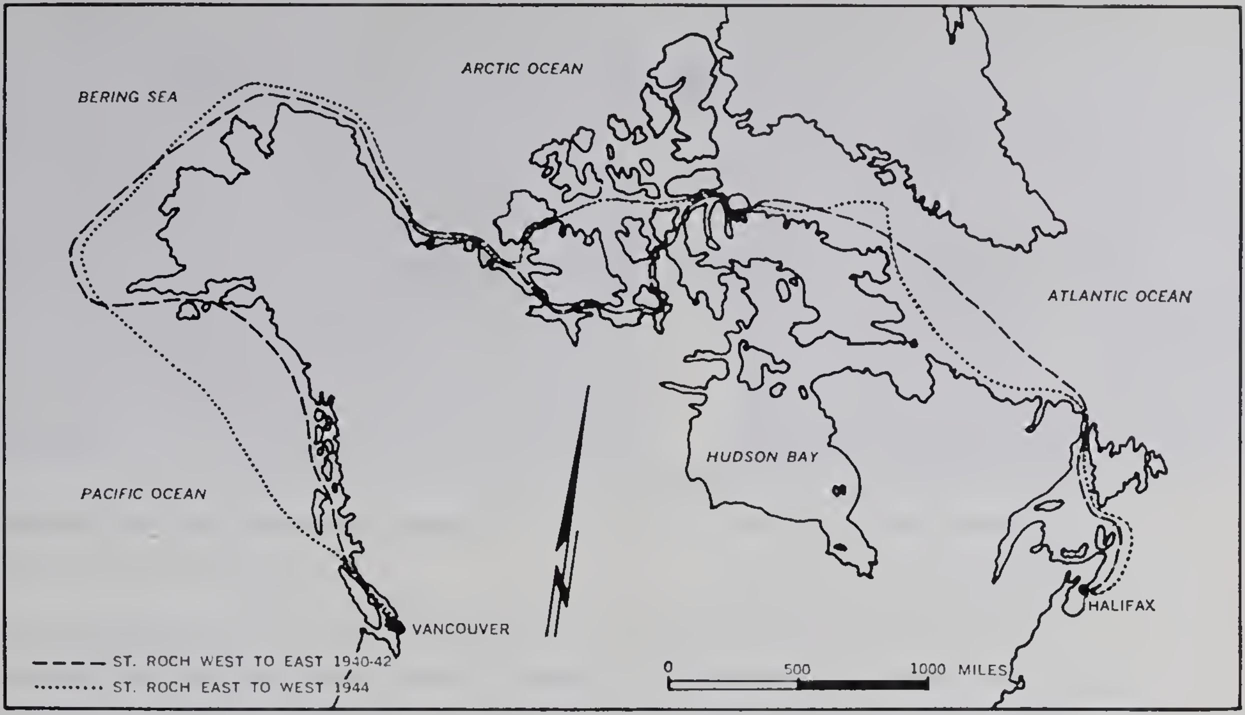
*This account is reproduced here through the courtesy of the editors of *Weekend Magazine.*



10—6 This map shows the famous journeys of the "St. Roch"

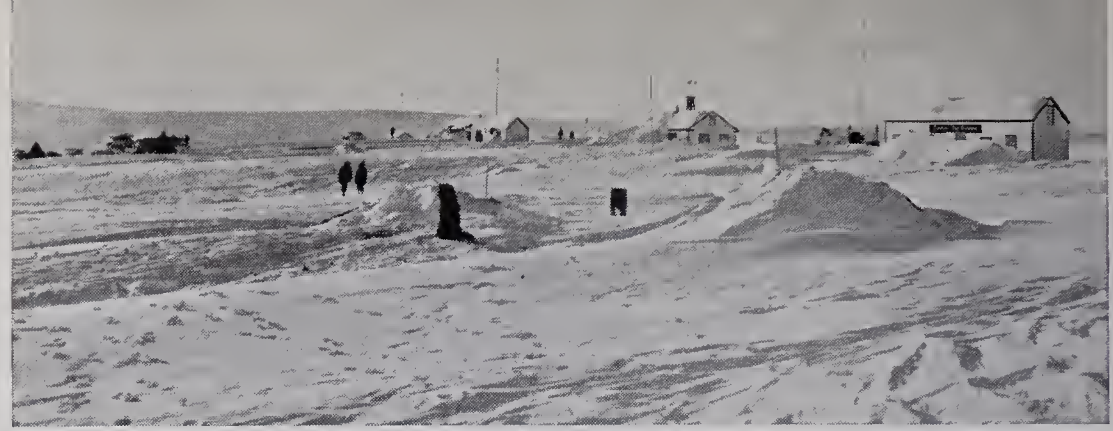
> out into McClintock Channel, we hit another storm and had to lay by again. Near Matty Island, the ice jam reached from shore to shore and the ice was being forced at us by northwesterly gales. I thought we were going to lose the ship. The force of the wind and the blizzard made it impossible to see. We dropped both anchors and prayed. All night long, huge ice floes crashed down on us while the gale tore at the rigging. But . . . the anchors held and the wind changed. We got moving again . . . (and) . . . found a small inlet (where) we anchored to avoid being pushed aground by the battering of the ice. We couldn't move for two days. The engine was useless against the ice pressure. A couple of days later we heaved the anchor and started for a patch of open water.

Locate Gjoa Haven in Figure 10-2. Later, the small vessel, powered only by sails and a 150-horsepower diesel engine, made the reverse journey from east to west. She thus became the first vessel to navigate the Northwest Passage in both directions. When the "St. Roch" journeyed through the Panama Canal, she became the first vessel in history to make a complete circle of North America. Her voyages helped to give Canada final claim to the Arctic islands that form such a large part of our Canadian Northland.

FIVE VIEWS OF LAND AND LIFE IN THE NORTHLAND

As you study the series of pictures referred to below, consider answers to such questions as these:

1. What are the functions of a small settlement such as Baker Lake?
2. What are winter conditions like at such a place?
3. How does the Arctic change in the summer time?
4. What is the relief of the land like in the Arctic?



10—7 Baker Lake is a typical small settlement in the central Arctic (National Film Board photo)

5. How is the life of the Eskimo changing?
6. What are some of the means of transportation used in the Northland?

1. Figure 10—7 shows Baker Lake, a small settlement west of Hudson Bay. Locate Baker Lake in Figure 10—2. Baker Lake is a fairly typical small settlement in the Canadian Arctic. A detachment of the Royal Canadian Mounted Police is located there. There is a Federal Government School and a nursing station. A Northern Service Field Officer has headquarters there. He represents the Department of Northern Affairs of the Canadian Government. His job is to see that government policies are carried out at Baker Lake, especially that of advancing the welfare of the Eskimo.

(a) The photograph was taken in the middle of the winter. A feature of the winter climate is the great wind speed. Note how the snow has become rippled and hard-packed as a result. However, snowfalls are not unusually heavy. You can tell that there is no more snow than would be seen in any town in Southern Quebec. At Baker Lake only seven inches of precipitation are recorded in an average year. About one third of this (21 inches) occurs as snow. How does this snowfall compare with that of Montreal and Ottawa?

(b) The building at the right hand side of the picture is a Hudson's Bay Company post. What activities would probably take place there?

(c) Baker Lake has a weather station and a telecommunications station (which transmits and receives messages by radio and telegraph). What evidence is there in the picture of these activities?

2. Figure 10—8 is a picture taken in summer on Baffin Island. Compare this picture with the winter scene that you have just studied, and note the differences between the two seasons in the Arctic.

(a) Describe the vegetation in the picture. This is typical of the treeless tundra.

(b) Describe the relief of the land. Much of the Arctic consists of terrain like this.

(c) Following is a description of the Arctic by Mr. Farley Mowat. How many of the features he mentions are shown in the picture?*

> I came to understand that the Arctic is not only a world of frozen rivers and ice-bound lakes but also of living rivers and of lakes whose very blue depths are flanked by summer flowers and by sweeping green meadows. The Arctic not only knows the absolute cold of the pole, but it also knows days of overpowering heat when a naked man sweats

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*From *People of the Deer* by Farley Mowat. Published by Little Brown 1952. Pp 10-11.

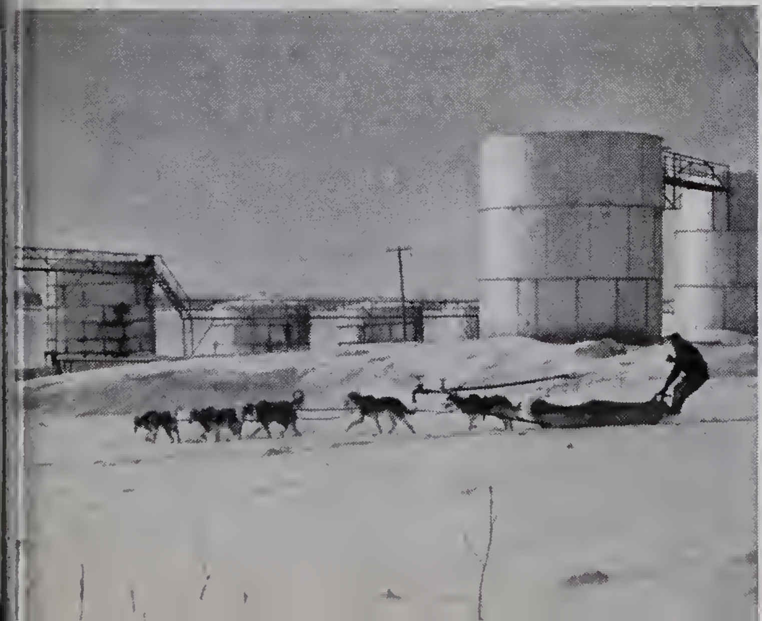
10—8 A great variety of plants grows in the tundra during the short summer. (National Film Board photo)

10—9 These Eskimos quickly learn how to operate modern oil drilling equipment. (Peter Bawden Drilling Ltd. photo)

> with the simple exertion of walking. And most important of all I came to understand that the Arctic is not only the ice-covered cap of the world but is also nearly two million square miles of rolling plains that, during the heat of midsummer, are thronged with life and brilliant with the colours of countless plants in full bloom. . . . It is a land of undulating plains that have no horizon, of low hills planed to a shapeless uniformity by the great power of the ice. It is a land of gravel, of sand — but without soil as we know it — it is almost half water, holding countless numbers of lakes and their rivers.

3. Figure 10—9 shows Eskimos receiving instruction in the operation of an oil drill. In what way might the lives of the men in this picture be different from the lives of the people at Pangnirtung, shown in Figure 10—1?
4. Figure 10—10 shows the only oil refinery in the Canadian Northland, at Norman Wells in the Mackenzie Valley. In which season was the picture taken? The oldest form of transportation in the Canadian Northland is shown in this photograph. Suggest reasons why land transportation is easier in some ways in winter than in summer. Although new roads and even some railways are being extended into the region in some places, the dogsled is likely to remain an important means of transportation.

10—10 A scene at Norman Wells in the lower Mackenzie Valley (Imperial Oil Ltd. photo)



10—11 View of the Mackenzie Mountains in the Yukon (R.C.A.F. photo)

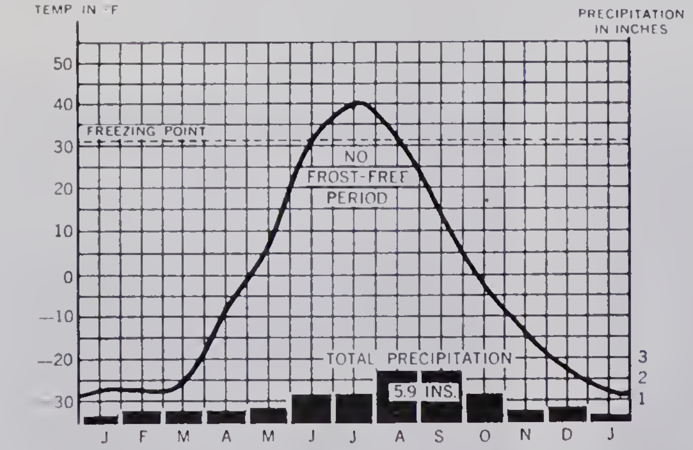
5. Figure 10—11 is a view in the Mackenzie Mountains in the Yukon, which are rather similar to the Rocky Mountains. Locate the Mackenzie Mountains on an atlas map. Far to the west in the Yukon lies the St. Elias Range, which is an extension of the Coast Mountains of British Columbia. This range includes Mount Logan, which, at 19,850 feet, is the highest peak in Canada.

CLIMATE, PLANTS, AND ANIMALS OF THE NORTHLAND

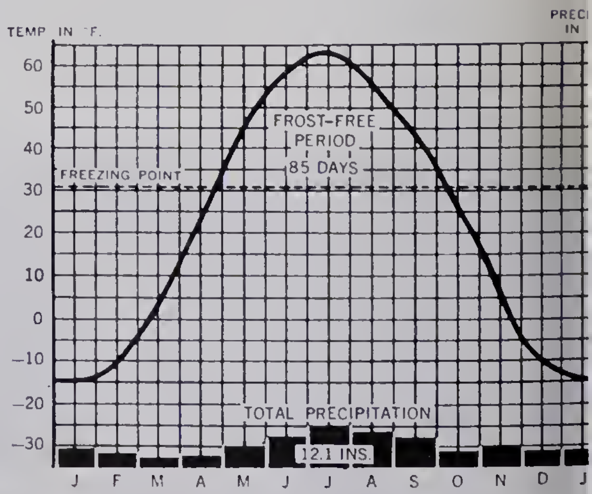
Further information on climate can be gained from a study of the graphs of two stations: Alert in the Arctic and Fort Smith in the Subarctic. Locate these places in Figure 10-2. Alert, located only 7½ degrees from the North Pole, is one of 18 modernly-equipped stations that Canada's Department of Transport operates in the Arctic. The Icebreaker "D'Iberville" visits the station yearly, although sometimes it cannot get through, and then Alert must be supplied from the air. Alert has the most northerly post office in the world. Weather stations at places like this send reports to Montreal, Toronto, and other cities, warning of approaching Arctic storms. These reports have helped to provide Canadians with much more accurate forecasts than in the past.

The climate of the Arctic and the Subarctic (Figures 10—12 and 10—13)

1. (a) For how many months of the year is the average temperature at Alert below freezing? For how many months is it below zero?
(b) How does the July temperature at Alert confirm the fact that this station has an Arctic climate? The highest temperature recorded there since the station was opened in 1950 was 68°F.
(c) The lowest temperature ever recorded at Alert was 54 degrees below zero. This is well above the recorded low for Canada of —81°F., set in the Yukon (in the Subarctic) in 1946.
(d) What is the total precipitation at Alert? Of this amount, 48.8 inches occurs as snow. How does this total compare with the snowfall at most centres in southern Canada? How does it compare with the total for your neighborhood? What facts already learned about precipitation in the Arctic does it confirm?



10—12 Climatic graph of Alert in the Northern Arctic Islands



10—13 Climatic graph of Fort Simpson in the Mackenzie Valley, N.W.T.

(e) A few frost-free days may occur at Alert during the year, but in some years there has not been recorded a single day free of frost. Some melting takes place in July and so during the short "summer" of only four weeks, more than 50 varieties of plants appear.

2. (a) How many months have average temperatures below freezing and below zero at Fort Simpson? The record low for this Subarctic centre is —69°F.

(b) What is the July average temperature at Fort Simpson? Compare this with the average for Victoria, B.C., given on page 398. The record high here is 97°F.

(c) What is the total annual precipitation at Fort Simpson? Of this amount, nearly eight inches occurs as rain. Note that no month receives as much as two inches of precipitation.

(d) The frost-free season there is 85 days. Why do plants grow faster there (at Latitude 62°N.) during the short summer than they grow at places farther south? This faster growth helps to make up for the short growing season. A Federal Government Experimental Farm is operated at Fort Simpson, and many crops have been grown successfully there.

3. Study Figure 10—20 and describe the various kinds of clothing worn for protection against the severe cold.

The variety of plants and animals in the Canadian Northland is amazing to those who think of this region as a cold desert. The tundra supports no trees, but does support dwarf shrubs. During the short Arctic summer, the ground is carpeted with beautiful wildflowers with a great variety of color. In the Subarctic region, the coniferous forest (or taiga) is very similar to that found farther south. Such forests, as those shown in Figure 10-4, support a modest lumbering industry in the Northwest Territories, and the Yukon.

Some of Canada's largest animals, including the caribou, the musk-ox, and various species of bear, such as the polar and grizzly, live in the Northland. Some of these are grazing animals which are able to sustain themselves on the grasses, mosses, and lichens of the tundra, even in winter. Smaller creatures include the fox, the hare, lemmings, squirrels, and mice. The white fox is the most important source of income for trappers in the Northland. Figure 10-14 shows an Eskimo trapper examining a white fox fur. The muskrat ranks next in importance in the modern fur trade. Hundreds of thousands of these creatures are caught each year in the delta of the Mackenzie River. Figure 10-15 shows that the beaver is trapped in the Subarctic region. The seal is probably the most important inhabitant of the Arctic seas, although the Eskimo also depend upon fish such as the Arctic char and cod. Freshwater fish are important in the Subarctic and commercial fishing has developed on Great Slave Lake in recent years.

THE PEOPLE OF THE CANADIAN NORTHLAND

Figure 10-9 suggests that the life of the Eskimo is undergoing great change today. In 1960, the first Eskimo minister was ordained in the

10—14 (left) An Eskimo trapper and his son examine a white fox fur. (National Film Board photo)

10—15 (right) Two Indian trappers in the Mackenzie Valley return from a successful expedition. (National Film Board photo)

Anglican Church. Another became chief officer in charge of a centre for assisting disabled Eskimos. A third Eskimo became an announcer in the C.B.C. Northern Service. Others are employed as miners and on defence stations in the Arctic. What these changes mean to individual Eskimos may be understood by the story of Paul Tookaluk.*

> Two years ago, Paul lived in the western Arctic, in igloos in winter, in canvas tent in summer. He caught seal and caribou and trapped white fox. From these skins and their family allowance, his total cash income might average about $600 a year, with which he would buy ammunition, flour, tea, some other store foods, some materials to supplement his family's skin clothing. . . .
>
> Then . . . Paul went to work at a site on the Distant Early Warning Line. The revolution in his life had started. He was strange to the idea of a job — first of all to the idea of time, to starting and stopping work by a clock, to staying in one place. He lived in permanent buildings, ate store food, and dressed entirely in white man's clothes. . . . And he found he had money, two or three thousand dollars a year, plus his food and fuel. . . .
>
> He was offered the chance to go 'outside' with other Eskimos, to study vehicle mechanics and basic English. . . . This was a time of immense personal excitement. Airplanes had long been commonplace to him, but as he was driven from Edmonton Airport to the school at Leduc, he exclaimed in wonder, 'It is wonderful, you know this is the first time I see a car.' And as they drove out in this voyage of discovery, he banged the window and shouted, 'Look, look, trees, you know I have not seen a tree.' And Paul stared in delight at the row of telegraph poles along the prairie road.

Eskimos make up about one third of the population of the Canadian Northland. Describe the location of the Eskimo groups in relation to the tree-line. Compare their location with that of the main Indian groups shown in Figure 10-16.

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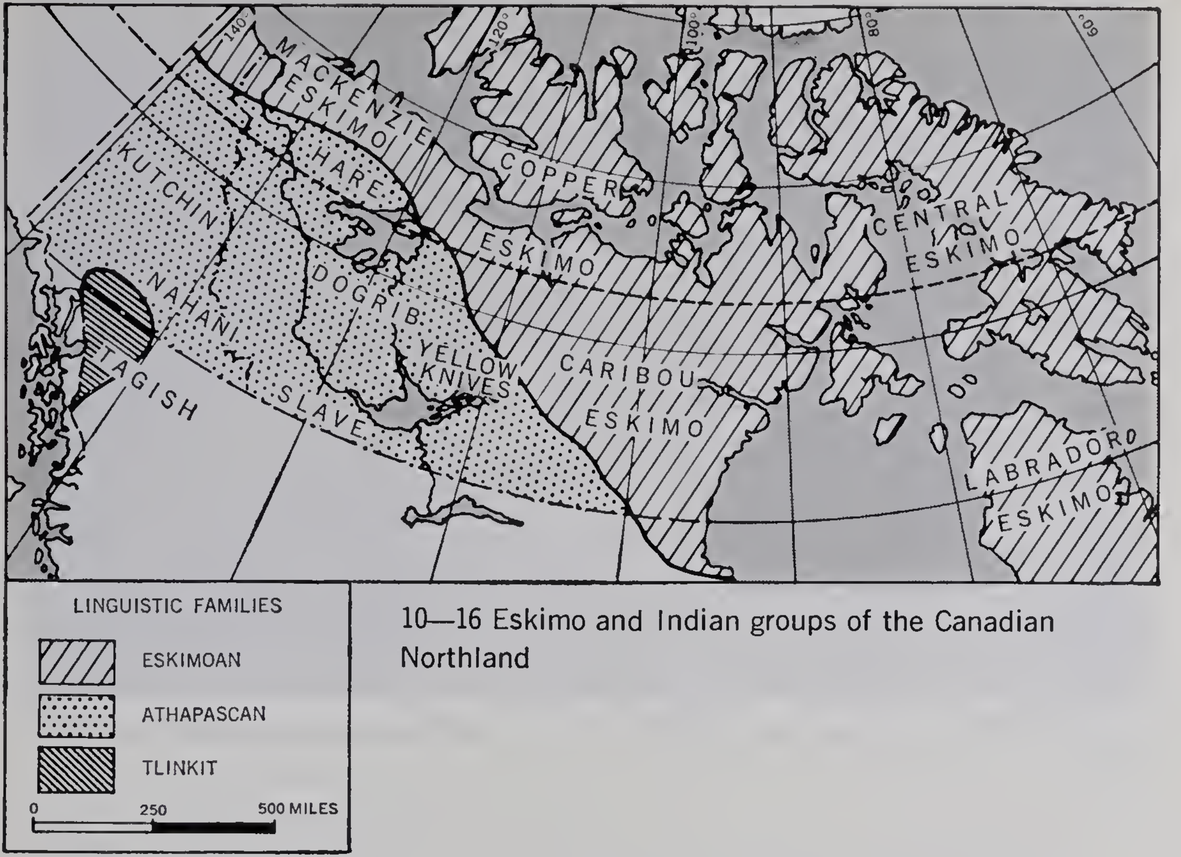
*This account is based on a radio talk by Mr. R. A. J. Phillips and is reproduced here through the courtesy of the Department of Northern Affairs and National Resources.



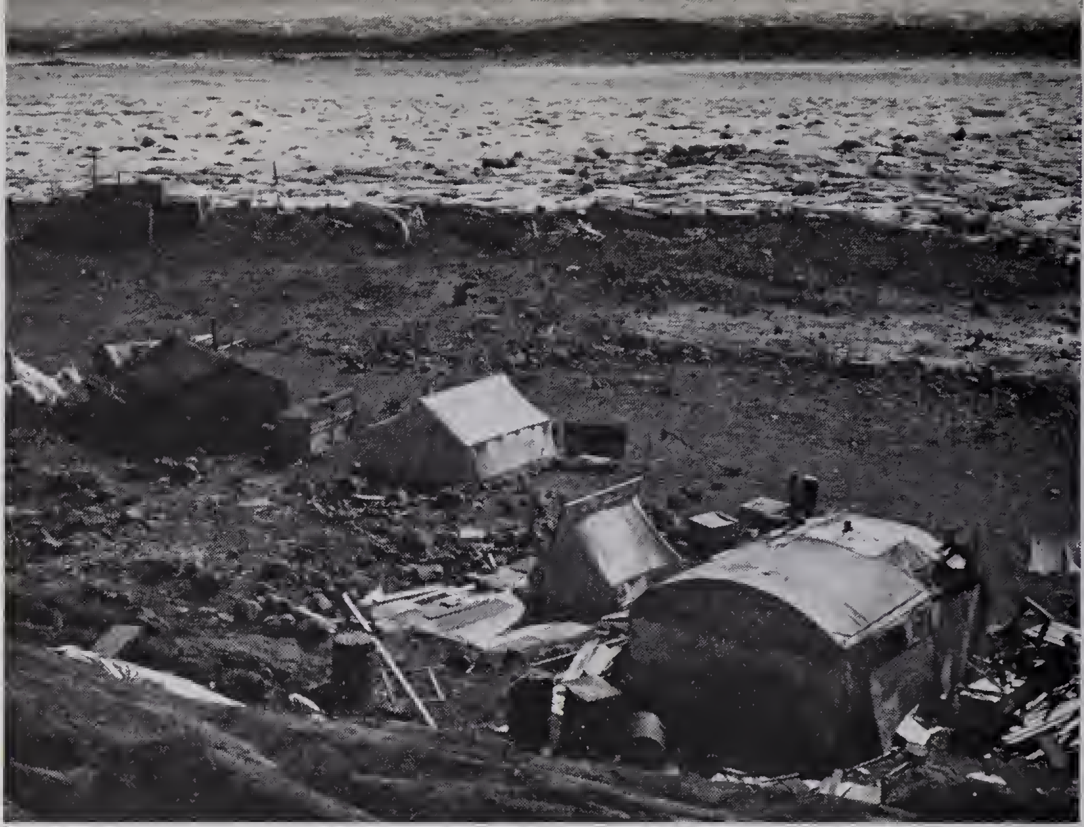
10—16 Eskimo and Indian groups of the Canadian Northland

Most scientists believe that the Eskimos came to North America from Asia by way of Bering Strait. Trace this route on a globe. They have lived in the lands they now occupy for about 2000 years. Until about 100 years ago, they lived as *semi-nomadic* hunters and fishermen. Since then, their way of life has changed a great deal, as in the case of Paul Tookaluk. This has resulted from their contacts with explorers, white fur traders, the Royal Canadian Mounted Police, whalers, missionaries, government officials, and military personnel.

The Central Eskimos of Baffin Island and the Foxe Basin are more like those of earlier times than any others.

Old and new ways of life among Canada's Eskimos

1. Figure 10—17 shows a Central Eskimo summer settlement near Frobisher Bay, on Baffin Island. Locate Frobisher Bay in Figure 10—2. The picture shows that some Eskimos continue to lead semi-nomadic lives, in tents in the summer time.
(a) What are the tents in the picture made of? How do they show the influence of the white man?
(b) Pick out other objects in the picture that show that these Eskimos have had considerable contact with the white man.
2. In winter, some of the Central Eskimos continue to use their traditional snow-houses or igloos. Figure 10—18 shows an Eskimo constructing his igloo. The first blocks of snow are placed in a circle that outlines the floor area. The rest are laid spirally until the last block covers the apex of the dome.
(a) What is the man in this picture doing?
(b) How can you tell that he has been influenced by the white man?



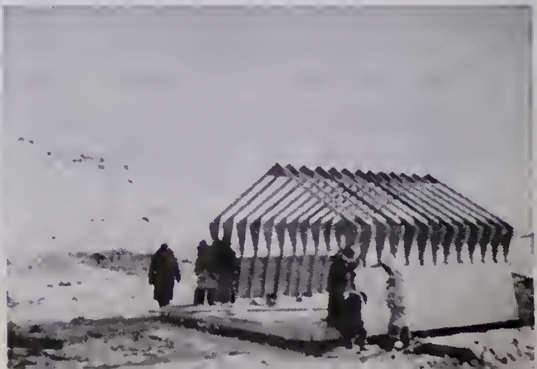
10—17 An Eskimo village near Frobisher Bay on Baffin Island (Imperial Oil Limited photo)

3. Some igloos are now being constructed from plastic foam blocks made in southern Canada. Figure 10—19 shows another type of dwelling introduced to the Eskimo by the white man.
(a) What are the Eskimos in this picture doing?
(b) How do you know that the construction material could not have been obtained in the neighborhood? A rigid-frame house like this, 16 feet by 16 feet, costs $500 at Montreal. It is being provided as part of the government's ten-year program for providing low-cost Eskimo housing.
4. Refer again to Figure 10—14. What have you already learned about the importance of the white fox to the Eskimo? The sale of paintings and carvings and a small tourist industry are becoming important sources of income to the Central Eskimos. In 1960 about $120,000 was earned from art work. Fish and game attract white sportsmen from southern Canada. Guide services and the operation of tourist lodges at Cape Dorset and Frobisher Bay provide income to some Eskimos on Baffin Island.

Despite new ways of living open to some of them, about three quarters of Canada's 12,000 Eskimos continue to make their living from hunting and fishing. In some cases, those Eskimos who are especially anxious to continue their old way of life are being moved to better hunting grounds farther north. Even they, however, have

10—18 An Eskimo builds his new igloo. (National Film Board Photo)

10—19 Modern Eskimo housing under construction (Northern Affairs photo)



10—20 This is the Hudson's Bay Company post at Baker Lake. As purchases are made, sticks or skins are moved aside, showing the Eskimo how much he has spent, how much he has left. (National Film Board photo)

seen great changes in their lives. Before the white man came, they fished and hunted to provide food and clothing for their families. Today, they fish and hunt so that they can trade their goods, mainly furs, for food and clothing manufactured or processed by the white man in cities far from the Northland. Figure 10-20 shows an Eskimo trading fur at a Hudson's Bay post. He will obtain in exchange some of the goods on the counter and shelves. Find some products that are sold in your neighborhood store or supermarket.

Collection of eider down and herding of reindeer are further sources of income that the government is promoting among the Eskimos. Other, more direct ways of helping them include the provision of modern medical services. There are now 10 hospitals and 15 nursing stations in the Northwest Territories and the Yukon. Many Federal schools have been built in recent years. The school at Inuvik, shown in Figure 10-23, is the largest in the Canadian Arctic. In the future, many Eskimos will complete high school, and some will attend universities. For many years now, Eskimos have received family allowances, old age pensions, and other benefits formerly restricted to other Canadians.

In spite of the progress that has been made, the Canadian Eskimo is still far from being a full citizen. The white man did not realize for a long time how his invasion of the Arctic had disturbed the lives of the natives. Now that the Eskimo has been introduced to our civilization there is no going back; and in the future, more and more Eskimos will take their places in jobs familiar to southern Canadians.

The Indians of the Northwest Territories and the Yukon number only 6000, or about three percent of the total Canadian Indian population. Nearly all of these people live south of the tree-line, in the region we have called the Subarctic. Most of them are concentrated in the Mackenzie Valley. Study Figure 10-16 and note the distribution of these Indians of Northern Canada. In former times, they traded with the Eskimos and occasionally fought with them. However, the Indians feared the treeless barrens of the Arctic and seldom ventured beyond their native bush. Only at the mouth of the Mackenzie River did the two groups come into much contact.

The activities of white explorers and traders affected the Indians much earlier than the Eskimos. Their country was more easily reached, and its forests abounded with fur-bearing animals.

By 1850, fur trading posts were well established in the Mackenzie Valley. Soon, the Indians were engaged in trapping in order to trade for the white man's goods. Trapping remains an important occupation today. Figure 10-15 shows two Indians returning home with animals caught in their traps. Which season of the year is this? What animal have the men trapped? How do the men travel through the forest? Did they probably make their own clothes? Explain.

In recent years, income from trapping has declined considerably as a result of lower prices for furs and a decrease in game resources. Like the Eskimos, the Indians of the north have been attempting new jobs. Cultivation of crops is possible in the Mackenzie Valley and some Indians are being encouraged to become farmers. Much more government assistance and greatly improved education, health, and welfare services will be necessary if they are to become full Canadian citizens.

White people make up about half the population of the Yukon and the Northwest Territories. Only a few are found in most small Arctic settlements, where the Eskimos are usually a majority. Frobisher Bay, on Baffin Island, which is becoming a major international air centre, may soon become the largest centre of white settlement in the Canadian Arctic. Make a list of the kinds of work done by white men in the Arctic.

The majority of the population in the Mackenzie Valley and the Yukon are of white origin. They are concentrated in a few large settlements such as Yellowknife, Hay River, Fort Smith, Aklavik (Inuvik), and Whitehorse. These settlements include nearly half of all the white people who live permanently in the Canadian Northland. Considerable numbers also live at smaller centres such as Norman Wells, Port Radium, Dawson, and Mayo. Locate all these centres in Figure 10-2.

SIX SETTLEMENTS IN THE CANADIAN NORTHLAND

What is most noticeable about the location of Yellowknife, Fort Smith, Inuvik, Whitehorse, Dawson, and Fort McPherson in Figure 10-2? In this section, we shall discuss each of these centres in turn.

Yellowknife, with a population of about 4000, is the largest town in the whole of the Northwest Territories. It developed when gold was discovered near the site in 1934. Ten years later, a second major ore body led to a great expansion. For many years, the town had only air and water connections with the outside world. Since 1960, it has been possible to drive from Yellowknife to Edmonton in all seasons, although the road must be closed for a few weeks each spring and fall. Yellowknife is very much like towns in the mining belts of Quebec and Ontario, with nearly all the services of a modern town, including modern hotels, restaurants, and recreation facilities.

Fort Smith is located below the rapids of the Slave River and originally grew up as a portage point, where freight was transferred from trucks to barges and boats. What source of income for the people is suggested by the photograph in Figure 10-4? A winter road now connects Fort Smith with Edmonton. The town has a hospital, a mission, and several schools. Describe the relief of the land in Figure 10-4. This is quite typical of the appearance of much of the valley of the Mackenzie River and its tributaries. Describe the vegetation of the Fort Smith area. This quite dense forest resembles that of Canadian Shield regions farther southeast.

Inuvik – The story of Inuvik illustrates how modern scientific planning can enable man to live and work successfully in a difficult land. Figure 10-21 shows a group of small Eskimo and Indian children in their school at Inuvik. Some of these children live in tiny villages many hundreds of miles away. When school opens in September, a government airplane comes to take them to school, where they live in a boarding establishment. In summer, they return to their native villages where the older children may help their fathers hunt seals or trap the white fox.

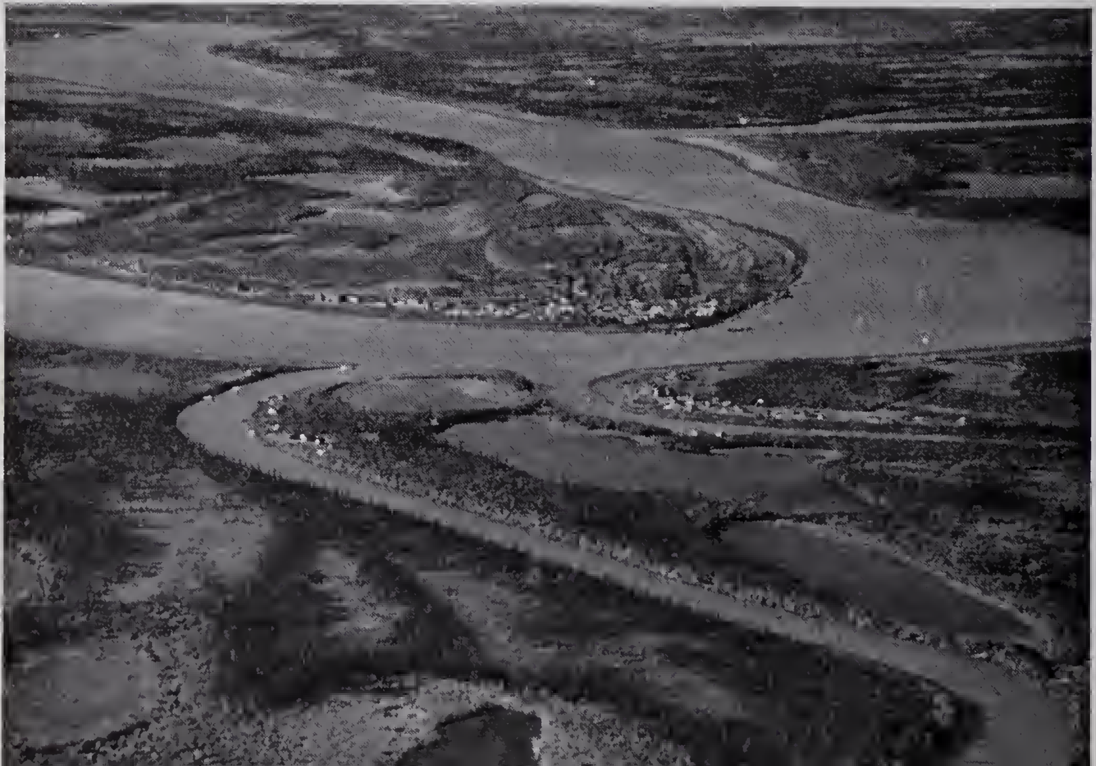
On the map in Figure 10-2, locate Inuvik and Aklavik near the mouth of the Mackenzie. In which direction does Aklavik lie from Inuvik? Describe where both towns lie in relation to the Arctic Circle.

10—21 Indian and Eskimo children attending their new school at Inuvik (National Film Board photo)

Both settlements are served by air, but the only surface route to them is via the Mackenzie River. River boats and barges (of the type shown in Figure 10-29) carry freight from Hay River, during the short summer. How far is Inuvik from Hay River? from Edmonton? Figure 10-2 and an atlas map will help you to answer these questions. Inuvik is really the new site of Aklavik. Many of the services and people were transferred from the latter town which proved to be an unsuitable place for a settlement. In this section, we shall try to answer two questions: Why was Aklavik an unsuitable place for a settlement? How has Inuvik been developed as a better site?

Figure 10-22 provides a view of Aklavik. This place is almost at the tree-line. As the picture shows, some surprisingly large trees can grow

10—22 The site of Aklavik on the Mackenzie River delta (National Film Board photo)



north of the Arctic Circle. Describe the relief and drainage of the land visible in this picture. The Mackenzie delta area is the greatest breeding ground of the muskrat in Canada. Describe the location of the main part of Aklavik. What problem is faced by the people of this town in the late spring or early summer?

Aklavik began in 1912 as a trading post. It lies on a bank of frozen silt and ice, jutting into the west channel of the Mackenzie River. A Canadian government official has described the site very well:

> From the air, one looks down on a vast confusion of lakes stretching over the horizon and laced together by dark green patches of spruce forest. Below, the brown waters of the Mackenzie wind down to the sea.

Compare this description with the scene in Figure 10-22. Why are the waters of the Mackenzie brown in color?

Aklavik was, for some time, the most important centre in the Canadian Arctic, with an R.C.M.P. post, Anglican and Roman Catholic missions, and medical and educational facilities. It became known as one of the few places in Canada where Indians and Eskimos and whites lived and worked happily together. Its chief natural resource was (and is) the muskrat which made it an important trading centre. However, Aklavik is subject to flooding, as its low-lying site (only 30 feet above sea level) might suggest. It is also built on permafrost, a mixture of ice and silt, which is actually 60 percent ice. The top or "active layer" of two or three feet thaws in summer and freezes again in winter. When the sun and heat from buildings melts the ice in the soil, the water is unable to drain away. Great pools form, surrounded by thick mud. In addition, the Mackenzie River is eroding the site, and gradually carrying the silt on which the town rests into the Arctic Ocean.

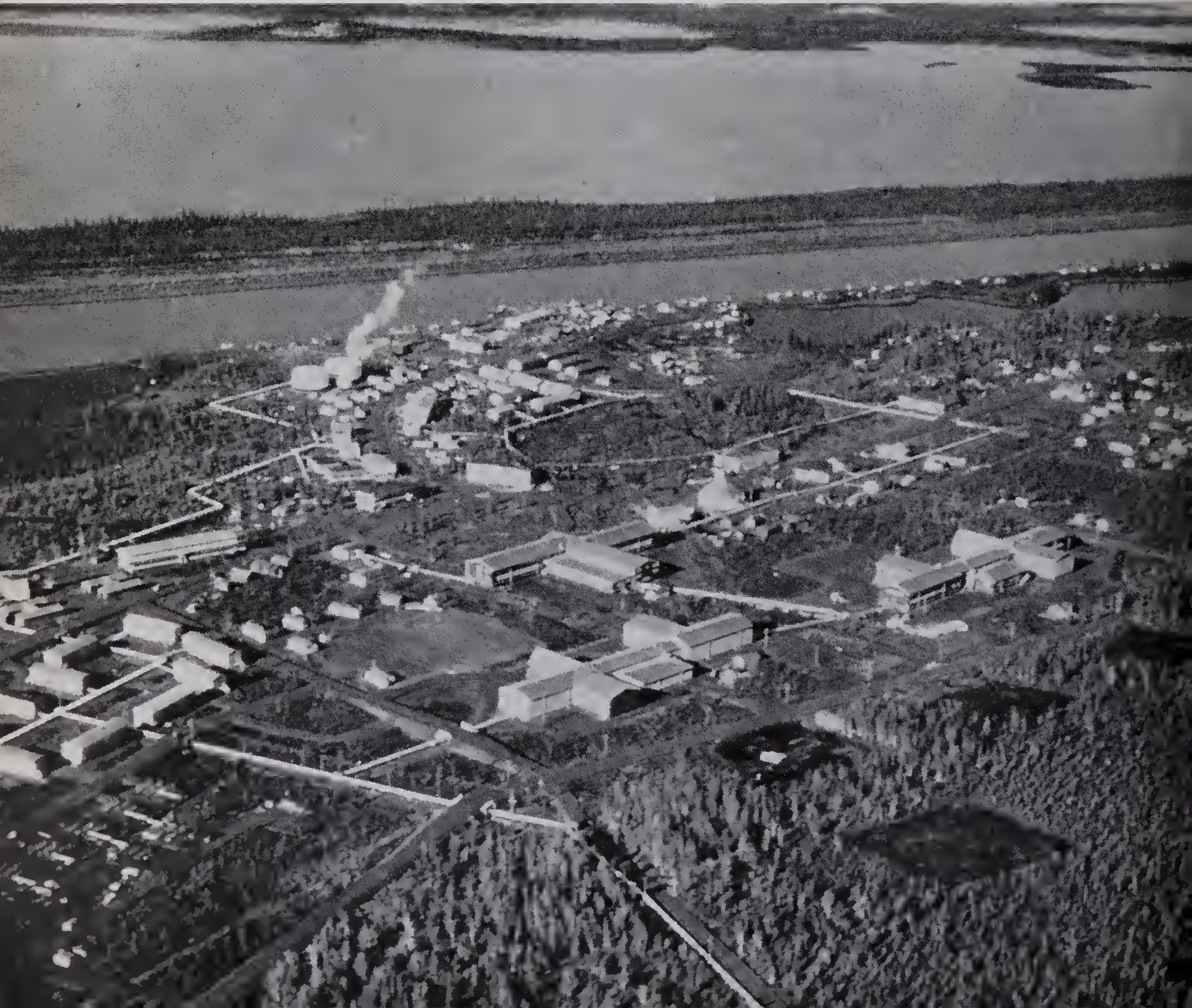
In 1954, the Canadian Government organized a survey team to find a new site. From a study of aerial photographs of the entire Mackenzie delta area, nine possible sites were selected. Further study on the ground narrowed the choice to "East 3," the present site of Inuvik on the east bank of the Mackenzie River. A list of requirements was drawn up for the new town and this list guided the search for the site. The requirements for Inuvik were stated as follows:

1. The ground must be suitable for permanent sewer and water systems, building foundations, and roads.
2. There must be access to a good river channel.
3. There must be a suitable site for an airfield.
4. There must be a suitable water supply.

10—23 The new Federal School at Inuvik (National Film Board photo)

The site selected is shown in Figure 10-24. Inuvik covers 275 acres and extends along the east bank of the east channel of the Mackenzie River. It was planned for a population of 1300, with room to grow to

10—24 Inuvik, "the place of man," from the air (Northern Affairs photo)



5000. It is on fairly high well-drained ground, surrounded by low wooded hills which may be seen in the background of Figure 10-23. There are extensive gravel deposits which were of importance in developing the site. The town has good docking facilities and is near a main shipping point.

Construction work began at the site in 1955. The start was delayed for a few weeks in June of that year, until the Eskimo workers had finished their annual trapping of the local muskrats. Material and equipment (including trucks, tractors, power shovels, bulldozers, steam drills, and cranes) had to be freighted in by barge. Men and light materials were flown in by plane.

The problem of permafrost at Inuvik

1. Figure 10—23 shows the new Federal School, attended by the children you saw in Figure 10—21. With 32 classrooms and 600 pupils, this is the largest school in the Canadian Arctic.

(a) The school has no basement. What kind of foundation has been provided for it? Try to suggest why the school (like most buildings in Inuvik) was built in this way. Other buildings and all the roads were built on "pads" or layers of gravel 2-3 feet thick. How would this help to overcome the problems met at Aklavik?

(b) Note the long, white box-like structure in the foreground of the picture, leading into the school building. This is a utilidor, possibly the most remarkable device used in the building of Inuvik. A utilidor is an insulated container, running above the ground on stilts. It contains water and sewer pipes. There are warm and cold pipes in the utilidors. The warm water prevents the cold water from freezing and is also used to heat the buildings. The utilidor system is operated from a central plant. No individual heating systems are necessary. Electricity is supplied from the same plant, the steam from the generators being used twice—to produce power and to heat the town. Most buildings in Inuvik thus have electricity, central heating, hot and cold water, and indoor plumbing. The town water supply comes from a lake about six miles away.

2. Figure 10—24 provides a general aerial view of Inuvik. Study this carefully.

(a) How can the utilidor system be identified?

(b) What planning problem arose from having utilidor and road systems together? How was this problem overcome?

(c) Notice that the roads are elevated even where they do not meet the utilidors. What was the purpose of building them in this way instead of cutting them into the permafrost?

(d) Where is the steam-power plant located? What fuel is used in this plant? How is this fuel brought to Inuvik?

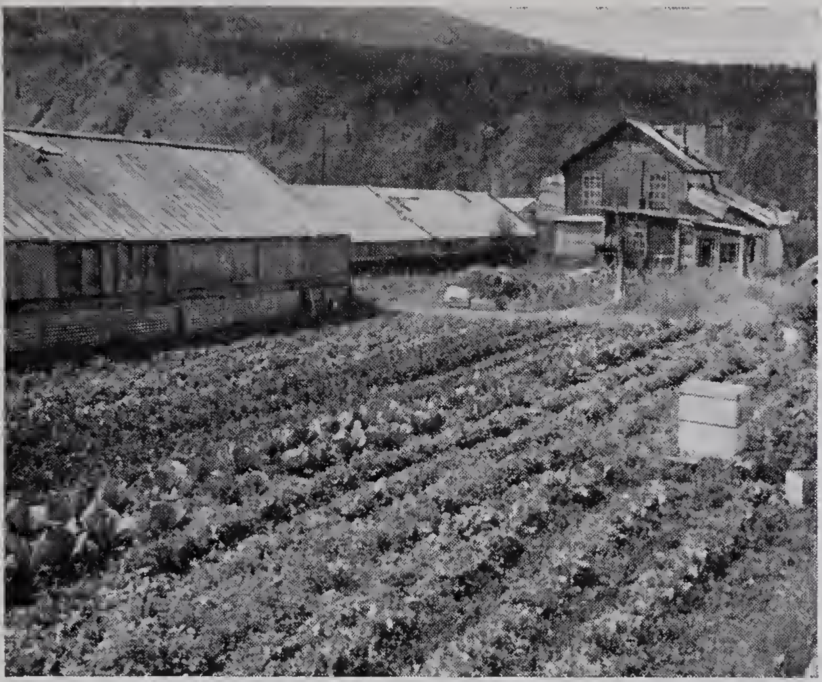
Problems related to building on permafrost were very carefully considered in developing Inuvik. The larger buildings were constructed on stilts. These rest on piles which were placed in holes drilled by steam into the ground to a depth of about ten feet. Smaller buildings and roads were built on gravel, so that heat from them will not thaw the ground.

Inuvik is an Eskimo word meaning "the place of man." It is probably the most carefully planned town in Canadian history. The site has proved to be a wise choice and the location a pleasant one. Although located 150 miles north of the Arctic Circle, Inuvik has attractive stands of poplar, spruce, and balsam and patches of green meadow that were used to advantage in landscaping the town. The summers, although short, are warm and temperatures of 90°F. in July are not uncommon.

The greatest importance of Inuvik is the way in which it can serve as an example for future development in the Canadian Northland. The careful planning of the site and of the buildings and the efforts made to assist the Eskimos and Indians to a new and better life are the best lessons to be learned from the project. In the building of the town, the native people acquired many new skills. Most of the pile holes for the buildings were drilled by Eskimos who easily learned to operate the steam-driven equipment. Inuvik may mark a new stage in the progress of the Northland people.

Dawson City — Located where the Klondike River flows into the Yukon, Dawson was the scene of one of the greatest gold strikes in the history of mining. The Klondike Gold Rush began in 1898. Within two years Dawson contained 35,000 people — the largest Canadian centre west of Winnipeg. Today, an all-weather road and a railway (shown in Figure 10-28) connect Dawson with Whitehorse and the "outside." Regular air services also exist. In the early days of the gold rush, access to this remote place was by dog sled and river steamer.

10—25 The long line of goldseekers "packing up" Chilkoot Pass during the Klondike Gold Rush (Public Archives of Canada photo)



10—26 Market gardening at Dawson City (Richard Harrington photo)

The most famous route was by the Chilkoot Pass, shown in Figure 10-25. For two years a continuous line of men crawled over this pass, some making many trips in moving the ton of goods that each was required to pack by government regulation. Gold is still dredged from the creeks around Dawson and continues to provide the main source of income of the people.

Since the great days of the Klondike Gold Rush, Dawson has declined to its present small population of only 800 people. However, it continues to live with the memory of its dramatic past. Many of the old buildings are being restored. During the summer of 1962, thousands of tourists were attracted by the Klondike Gold Rush Festival and some attended theatrical performances given in Dawson for the first time in many decades. A new industry has been launched that may give employment to many people in the future.

Figure 10-26 shows that the fertile soils and long summer days at Dawson permit excellent crops to be grown. The market gardener who owns this land has several plots of vegetables and five greenhouses. Here in the Yukon and in the nearby Mackenzie Valley, there are thousands of acres of good farmland. Comment on the natural vegetation in the picture.

Whitehorse is the largest centre in the Canadian Northland. Situated on the Alaska Highway, at the northern terminus of the railway from Skagway, it has grown to be a city of more than 5000 people. Regular air services connect it with Edmonton and Vancouver. In 1952, it displaced Dawson as the capital of the Yukon. It provides school, hospital, and other services to the surrounding area.

Fort McPherson — Figure 10-27 is a map of Fort McPherson, on the Peel River, within the Mackenzie River delta.* Fort McPherson has a population of 453, most of them Indians who live by hunting, fishing, and trapping. Fort McPherson began as a Hudson's Bay Company post in 1840.

What can we learn about a small, older Subarctic settlement from a large-scale map?

1. List all the services (educational, religious, commercial, etc.) available to the people of this settlement. About 100 children are housed there during the winter when their parents are out trapping in the bush.
2. What means of transportation are used by the people? What navigation problems exist on the Peel River?
3. (a) What kind of fuel is used in the settlement? How is it brought to Fort McPherson?
   (b) Locate the power station in the village. Is this a thermal or hydro-electric power station? Give reasons for your answer.
4. (a) Fort McPherson has an average frost-free season of 73 days. What evidence is there that the people grow some of their own food?
   (b) What evidence is there that food and other goods are brought in only during the short summer season?
5. What building materials are available at this site? Describe the types of dwellings in which most of the people live.
6. Describe the location, shape, and approximate dimensions of this settlement.

RESOURCES OF THE NORTHLAND

Game resources of fish, meat, and furs continue to be important in the Northland. Which fur-bearing animals are most important? Game resources are also becoming the basis of a small tourist industry. Where is commercial fishing developing on a fairly large scale?

The chief mineral deposits now being exploited are shown in Figure 10-2. What important minerals are being worked at Rankin Inlet and Yellowknife? What ores are located at Pine Point? This is one of the largest mining developments now under way in the Canadian Northland. These ores are the direct reason for the extension of the railway north from Grimshaw to Great Slave Lake. About 600 people will be employed at Pine Point when full production is reached.

Exploration for oil has been under way for many years in the Canadian Northland. In the Mackenzie Valley alone, it has been estimated that 2000 miles of winter roads and trails have been cut by exploration crews. Locate the only producing site at Norman Wells.

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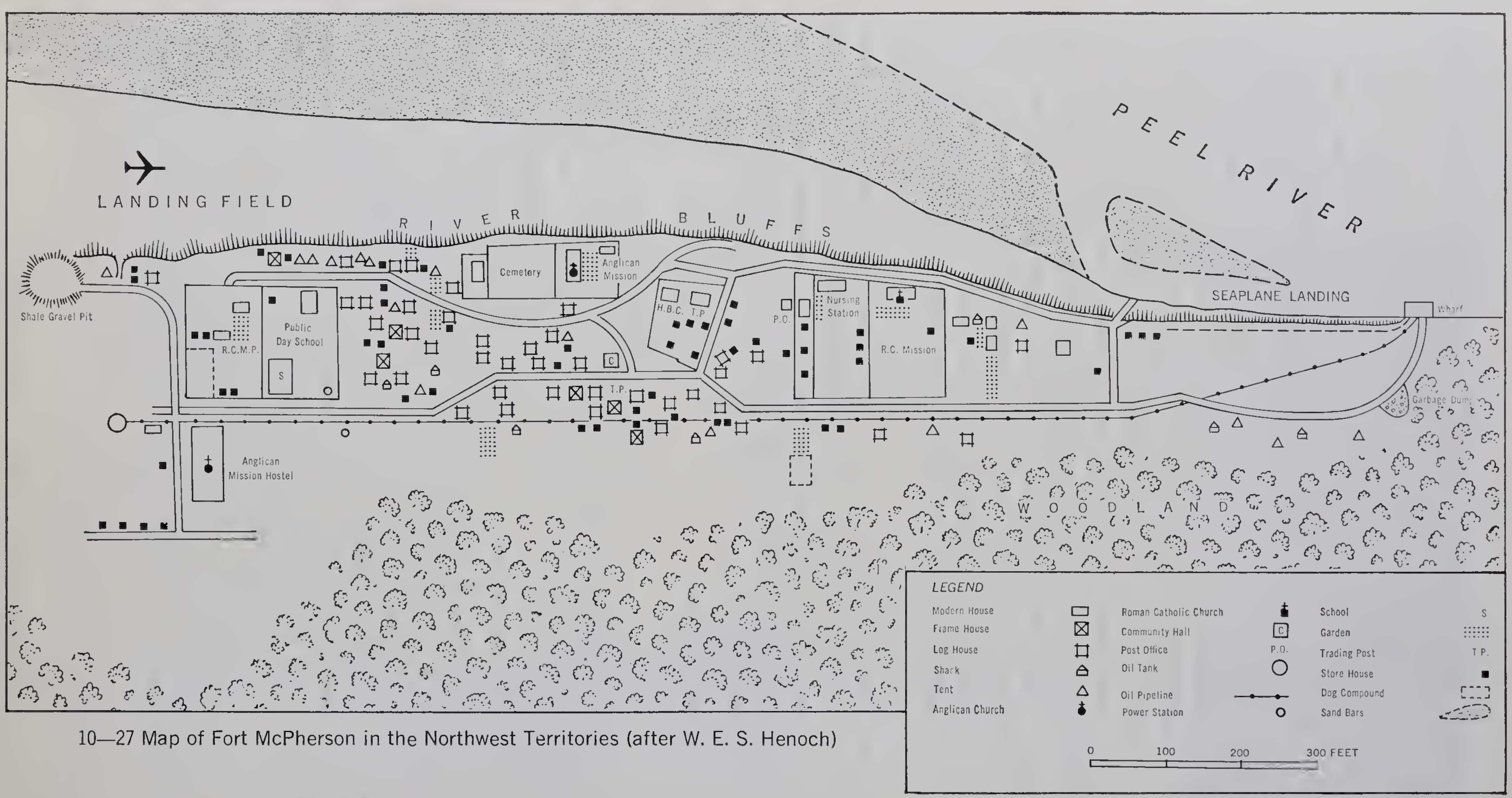
*This study of Fort McPherson is based on a fuller one prepared by Mr. W. E. S. Henoch and published in *Geographical Bulletin* No. 16, November, 1961. The map and accompanying material are reproduced here through the courtesy of the Geographical Branch, Department of Mines and Technical Surveys.



10—27 Map of Fort McPherson in the Northwest Territories (after W. E. S. Henoch)

A small refinery was built here during World War II. Oil storage tanks are shown in Figure 10-10.

Farm land has already been mentioned as a natural resource of the Canadian Northland. In 1961, there were 26 operating farms in the region, all located in the Yukon and the Mackenzie Valley. There is an important Canadian Government Experimental Farm at Fort Simpson. Wheat, barley, and oats have been raised and excellent yields reported. Alfalfa and other forage crops have been grown successfully. Vegetables and small fruits common to southern Canada have been grown at Fort Simpson. In the future, it is hoped that those Northland settlements south of the tree-line may be able to grow much of their own food. An uncertain growing season and small markets make it unlikely that there will ever be any large-scale farming, however. Several reindeer herds near Inuvik form the basis of an interesting form of ranching in the Northland. The animals graze on the tundra grasses and are tended by Eskimos. Fresh reindeer meat is available to Inuvik and other settlements.

TRANSPORTATION IN THE CANADIAN NORTHLAND*

Figure 10-28 is a map showing all-weather roads and railways in the Canadian Northland. In which part of the region is all this road and rail mileage concentrated? No roads or railway line exist in the Arctic. What forms of surface transportation are used in that region? Suggest reasons why, so far, no roads or railways have been built into the Arctic.

Transportation over the vast distances is a key problem in the Northland. In 1959, a quart of milk cost 70 cents in Yellowknife. After direct highway communication with Edmonton was established in 1961, the price dropped to 37 cents a quart. Compare this with the cost of milk in your home area. Goods must be transported hundreds of miles to Yellowknife over the Mackenzie Highway which was a very expensive road to build. Markets for food in such centres as Yellowknife are quite small. Your neighborhood supermarket probably has more customers than exist in the whole of the Great Slave Lake area. Why are roads very difficult to build in the Canadian Northland? Why does a small population mean more expensive transportation and higher prices for goods? Use an atlas to calculate the distance from Toronto to Inuvik via Edmonton. Describe how a range would be shipped to Inuvik from Southern Ontario. Why would the

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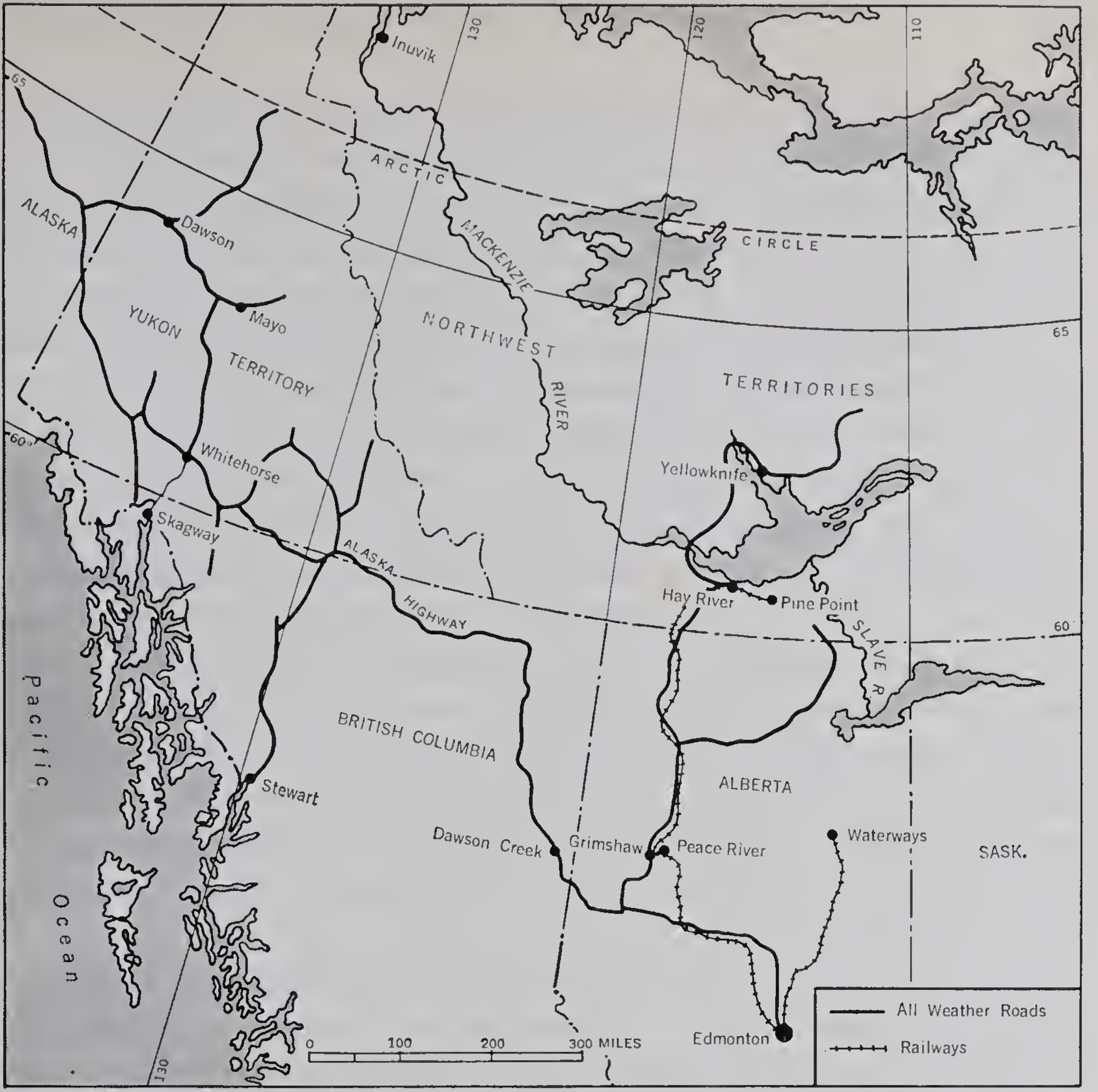
*Information in this section pertaining to roads in the Northland is based on a paper by Professor W. C. Wonders, Chairman, Department of Geography, University of Alberta, and is used with kind permission of the author.



10—28 Railways and all-weather roads of the Northland

journey add greatly to the price of the range? Many manufactured goods must be imported to the Northland from Southern Canada.

Great waterways such as the Yukon and the Mackenzie continue to play an important role in transportation. Figure 10-29 shows a diesel-powered tug pushing several barges up the Slave River near Fort Smith. Why would these goods not be transported by air? The Mackenzie River is navigable for nearly all of its great length of 1700 miles. Unfortunately, it is frozen over for eight or nine months of each year. Thus, a tug can make only two round trips during a season. However, the navigability of this waterway during the summer season

10—29 A tug pushing barges on the Slave River near Fort Smith in the Northwest Territories (Northern Affairs photo) is probably the chief factor permitting so much more settlement in the Mackenzie Valley than in the rest of the Northwest Territories.

As Figure 10-28 shows, there are only two railway lines in the Canadian Northland. What mineral discoveries caused the construction of the Yukon and White Pass Railway? the Pine Point route?

The Alaska Highway is the most famous of the all-weather roads shown in Figure 10-28. It begins at Dawson Creek in British Columbia and extends to Fairbanks, Alaska. Built during World War II as a supply route, when North America seemed threatened by Japanese invasion, the Alaska Highway has played an important part in the development of the Yukon. Another major road into the Northland is the Mackenzie Highway completed in 1949. In 1945, there were only 35 miles of all-weather roads in the Mackenzie Valley region. Today, there are more than 800 miles of such roads. Since September, 1960, it has been possible to drive 970 miles over an all-weather road from Edmonton to Yellowknife. The Mackenzie River must be crossed by ferry in summer and by ice-bridge in winter. For six weeks during the spring break-up and for about two months during the fall freeze-up, the crossing is not usable.

The full extent of all-weather roads in the Northland should be studied in Figure 10-28. In addition to these roads, there are many miles of trails and winter roads. The freezing temperatures, that prevent water transportation for eight months of the year, make it possible to operate winter roads. Many of these have developed from the trails used by dogsleds and by horse-drawn sleighs. Caterpillar tractors and bulldozers made their appearance at Yellowknife and other centres around 1938. These vehicles can travel freely overland and can cross ice-covered lakes and streams. Tractor or "cat" trains – strings of sleds pulled by caterpillar tractors – supplied Yellowknife over winter roads until recently. With the new all-weather road now available, trucks (which average 25 miles per hour compared to an average of only four miles per hour for "cat" trains) now serve Yellowknife. Tractors are still used in many other parts of the Northland, however.

The building of roads is having considerable effect on life and conditions in the Mackenzie Valley, and cost of living has been reduced considerably. Foods no longer need to be flown in from Edmonton. The truck rate for carrying freight from Edmonton to Yellowknife is one fifth that of air freight. Besides the price reduction of milk that the new road has made possible, it is interesting to learn that the price of eggs has declined from one dollar a dozen to 60 cents and a head of cabbage from 65 cents to 45 cents.

The number of trucks and automobiles has increased greatly and many new garages, restaurants, and hotels have been opened. Many tourists are now being attracted to the Mackenzie Valley. In March, 1962, the first motel in the Northwest Territories was opened at Yellowknife. Fish and lumber are now shipped out to markets in southern Canada from the south shore of Great Slave Lake.

Winter roads may cost as little as $200 per mile to build. All-weather roads may cost as much as $15,000 per mile, or even more. It will probably be many years before any highway reaches the shores of the Arctic Ocean. Winter roads are gradually being extended, but much study and thought will be necessary before any further major construction of all-weather routes is attempted.

Many of the new Arctic settlements were established and are maintained entirely by air. Only occasionally does an icebreaker reach such a remote place as Alert. Figure 10-30 shows an airplane unloading its cargo at an Arctic base. The engines are kept running because of the cold weather and the strong winds. It is difficult to repair and service planes under such conditions. The climate is only one special difficulty of flying in the Arctic. Explain why the magnetic compass is very unreliable. Suggest why navigation by means of the stars is impossible during the summer season. Map reading is very difficult in winter, when it is hard to distinguish between land and water. The lack of roads, settlements, and other familiar features makes map reading difficult in all seasons. Nevertheless, the airplane, more than any other means of transportation, has made it possible for man to conquer the vast distances of the Northland. Many years ago, a journey from Frobisher Bay to Point Barrow in Alaska took three years by dogsled. Today, the same journey can be accomplished in a day by airplane. The "bush pilot" has long been an important figure in the Canadian

10—30 Aircraft unloading at a Northland settlement (De Havilland Aircraft of Canada)

10—31 A bush pilot moors his plane on Great Slave Lake (N.F.B. photo)

Northland. Figure 10-31 shows a pilot mooring his craft on Great Slave Lake in the Northwest Territories. Light, easily-manoeuvred craft such as this carry men and supplies throughout the Northland. They are especially valuable to mineral prospectors, surveyors, and other such workers. The Canadian Northland will continue to depend for its transportation upon a greater variety of means than any other part of Canada. Make a list of all the forms of transportation used in various parts of the Northland.

Many people have asked if new provinces will ever be created in the Northland. It is possible that the Yukon and the District of Mackenzie will some day become provinces. This question is closely related to the future of the whole vast region that we have studied in this chapter. Mineral wealth and transportation are the keys to further growth. Most geologists believe that minerals are as widely distributed in the Northland as in the Canadian Shield regions to the south. If this is true, the future of the region seems assured, as world demand for minerals is certain to increase during the next century. The development of mineral resources will require many new access routes in the form of railways and especially roads. New mines and new routes will create new settlements. It seems likely that these settlements will be carefully and scientifically planned, along the lines of that in Inuvik. In all these developments, the native peoples will play an important part. They now sit on most town and village councils that control local government in the Northland. Territorial government is controlled directly from Ottawa although some officials are elected. The Yukon and the Northwest Territories each elect one member to the House of Commons.

The importance of Frobisher Bay and other air centres seems certain to increase during the jet age. Tourism, already an important source of income, will grow in importance. South of the tree-line, industries such as fishing and lumbering will give employment to increasing numbers of people. As population increases, more farmland will be brought under the plough.

Reviewing the Northland

1. Refer to the questions on page 444 and complete your answers.
2. The Northland is not a single vast region throughout which conditions are everywhere the same. List important differences to be found among various parts of the Northland.
3. In spite of differences, there are some points of similarity among all parts of the Northland. Make a list of items that all parts have in common.
4. Illustrate some ways in which men overcome the chief problem of the North, which is winter cold. How will climatic conditions prevent rapid development and a large increase in population?

CHAPTER 11

Canada from Sea to Sea

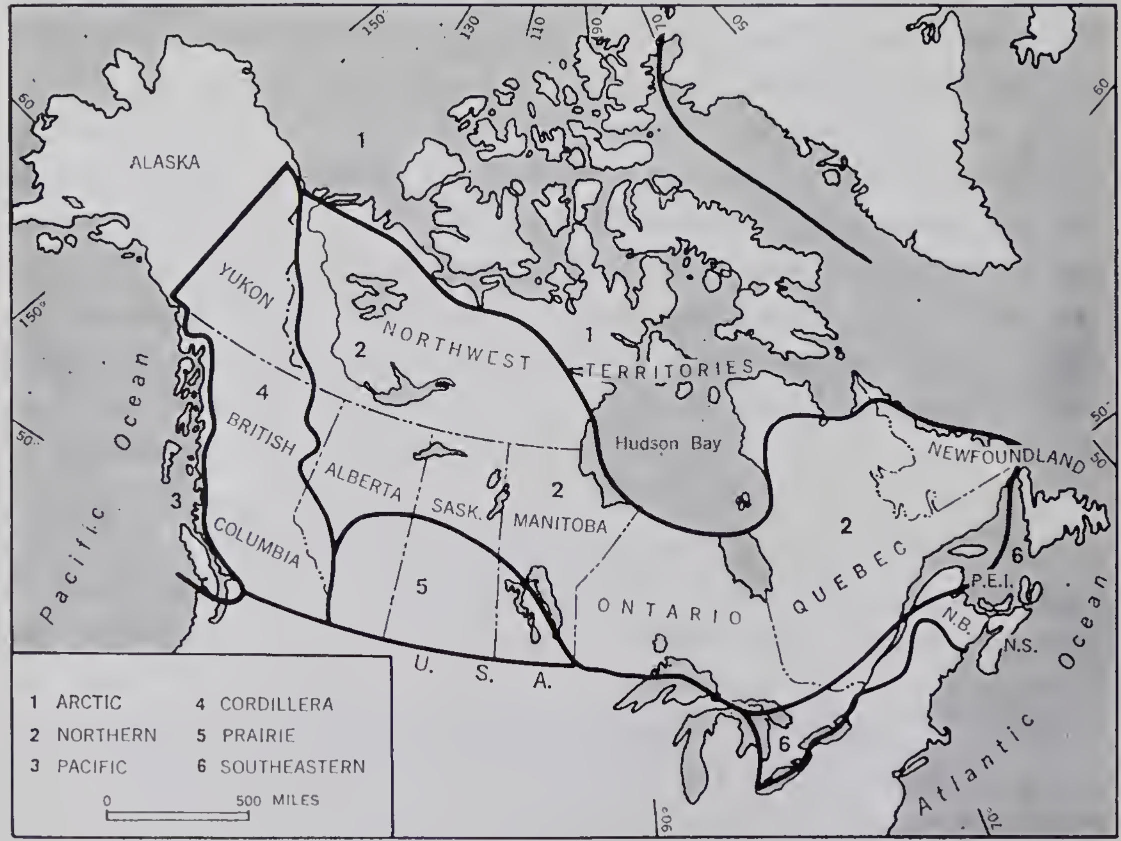
It is now time to draw together some of the main ideas which have been slowly developing about Canada as each section of the country was studied in detail. There are important generalizations to make and significant conclusions to draw. One big question was asked in Chapter 1: Why do people live where they do in the way they do? Part of this problem was discussed on page 4 where the chief features of the distribution of population were considered. In this chapter, an attempt will be made to use previous knowledge to answer the question more fully. Why, for example, do so many people live in Southern Ontario? Why are people quite evenly distributed throughout Prince Edward Island, while in Newfoundland most live along the coasts? Why is most of Labrador empty? Why are the dots strung out like beads on a string on the map of the interior of British Columbia? These and many other questions can be answered from knowledge gained from a study of Canada.

The most striking fact is that Canada is mainly an empty land. In comparison with such countries as England, India, and Japan, Canada contains many vast unpopulated areas and has a low population density. Yet it does contain some large cities and many good-sized towns. The two largest cities are among the largest in North America. Together, Montreal and Toronto contain nearly 4,000,000 people. About what fraction of the people of Canada live in these two metropolitan areas? Today, nearly two thirds of all Canadians live in towns and cities. Since 1900, Canada has become an *urbanized* nation. Yet the wealth and strength of Canada still depends very largely on its farms, its forests, its mines, its fisheries, and on the people who work in them, in dispersed settlements. The relief, the rocks, the soils, the vegetation, the climate, and other physical factors greatly affect the location and nature of occupations and industries. They affect where and how people live. Before most questions about the distribution and density of people can be fully answered, it is necessary to review some of these physical factors in Canada as a whole.

RELIEF, CLIMATE, SOILS, AND VEGETATION IN CANADA

1. An atlas or wall map, showing the relief of Canada, will be useful here.
(a) In which parts is the land too high or too steep to support many people?
(b) How do these high, steep areas affect the lives of Canadians who live a considerable distance from them?
(c) In what ways are these areas a problem to Canadians? In what ways do parts of them supply wealth and income to Canadians?
(d) Name some densely-populated areas of level plain in Canada. Name some moderately-populated plains areas. Name some large unpopulated plains areas. Why are they unpopulated?
(e) Where are the largest areas of mineralized rocks? How were these areas affected by the Ice Age? Describe the density of population, and the location and nature of settlements in them. Why has settlement been difficult in these circumstances? What natural resources are found besides mineralized rocks?
(f) Where in Canada was the Ice Age beneficial?

2. (a) Which parts of Canada have a growing season of at least 100 days? Describe the relationship between these parts and the distribution of population. Where is the longest growing season found?
(b) Where is the growing season too short for cultivation? How is this related to population density?
(c) Which parts of the southern, populated areas of Canada have the lowest annual rainfall? What connection do you notice between these areas and population density and distribution? Where and how have men overcome drought conditions?
(d) Describe the type and amount of precipitation in the Canadian Arctic.
(e) Describe the population distribution in the areas of heaviest precipitation in Canada.



11—1 The climatic regions of Canada (from the **Canada Year Book**)

3. Figure 11—1 shows the main climatic regions of Canada. Refer to climatic graphs in previous chapters and state two or three important features of the climate of each region. What are some of the most important differences between the Pacific and Cordilleran regions, between the Arctic and the Northern, between the Prairies and the Southeastern?

4. Figure 11—2 is a vegetation map of Canada.

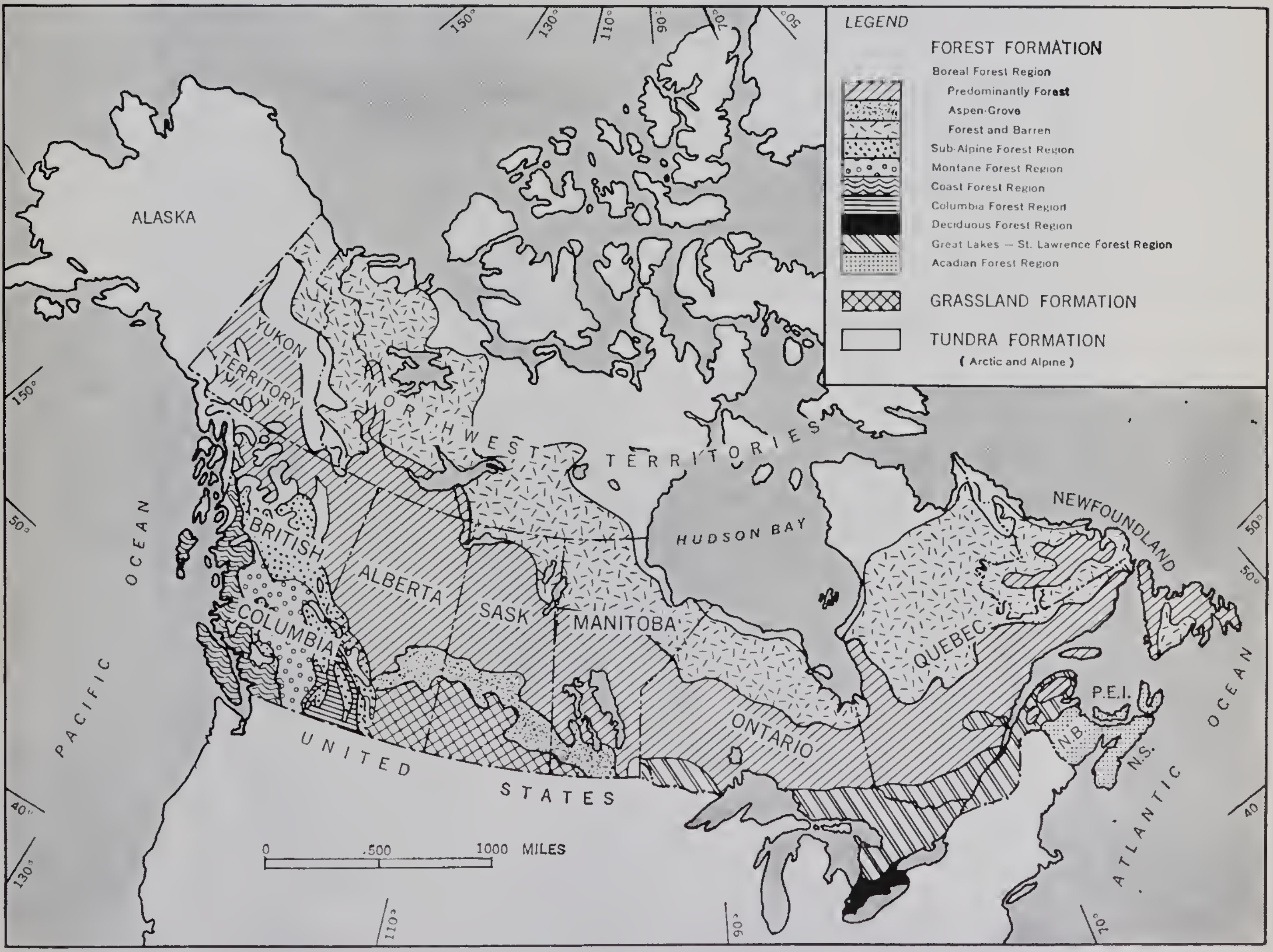
(a) Where are the main tundra areas found? These are treeless regions. Why are they treeless? Why is there such vegetation in a few parts of Southern Alberta and Southern British Columbia?

(b) Geographers call the "Forest and Barren" area a **transition zone** between the tundra and the main boreal forest to the south. What line separates the forest and barren from the tundra?

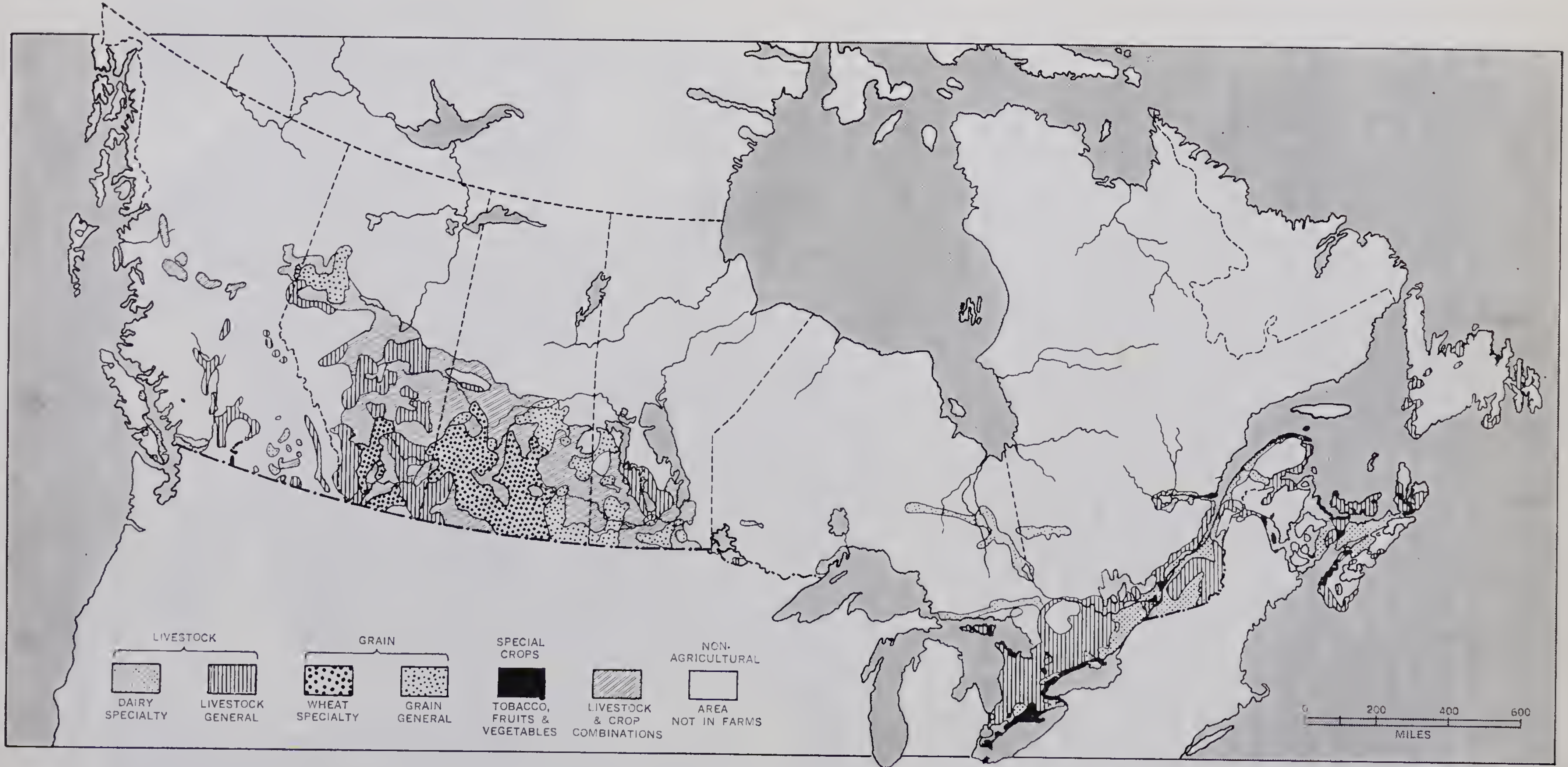
(c) The boreal zone consists mainly of **coniferous** trees. Why is this forest of great economic significance? What other natural resource of the boreal zone has been essential to the growth of the forest industries?

(d) Where is the largest non-forested area of southern Canada? Why are trees lacking there? How is the land used in that area?

(e) How does this map help to explain why "Prairie Provinces" is a poor name for Manitoba, Saskatchewan, and Alberta? Why has man made less use of the boreal forest in these provinces than in the eastern provinces?



11—2 Forest classification of Canada south of latitude 75°N.



11—3 Generalized types of farming in Canada in 1951 (after Dominion Bureau of Statistics)

(f) Name four provinces into which the Great Lakes-St. Lawrence forest region extends. This is another transition zone, consisting of mixed forest, composed of both coniferous (softwood) and deciduous (hardwood) trees. South of it, in Southern Ontario, lies a small region of entirely deciduous, or hardwood, forest. Why is very little of this forest to be seen in Southern Ontario today?

(g) How many different forest zones are found in British Columbia? Account for this variety. Which forest zone in this province is of greatest economic importance? What physical factors explain the existence of this forest zone?

5. Figure 6—9 shows the soil zones of the Prairie Provinces. Most of the main soil zones of Canada are represented on this map. How were the best prairie soils formed? Name some other areas of good soils in Canada. State reasons why the Canadian Shield is generally a region of very poor soils. State, with reasons, some other areas of poor soils in Canada.

Figure 11-3 shows the types of farming found in Canada. Although there are fewer farms and the average size of Canadian farms is larger than it was in 1951, the types of farming shown remain very much the same today. This map should be studied in conjunction with Figure 11-4.

FARMING IN CANADA

1. (a) Which two geographic regions contain most of Canada's cultivated farmland? Compare the two regions with respect to size, types of farming carried on in each, and variety of output.

(b) Wheat is the most important crop of the Prairie Provinces but is by no means the only crop. How does the map bear this out? Note the variety of farm output in Alberta.

(c) Note two areas of farming found in the Canadian Shield. Kapuskasing, studied in Figure 3—13, is located in one of these areas. Most of the Canadian Shield is unsuitable for farming. Why is farming possible in the Shield areas shown in Figure 11—3? Where are the markets for farm products in these areas?

(d) Name three areas of specialized crops in the Maritime Provinces and two such areas in British Columbia.

2. Figure 11—4 uses a map and pie graph to show the distribution of farms in Canada in 1951.

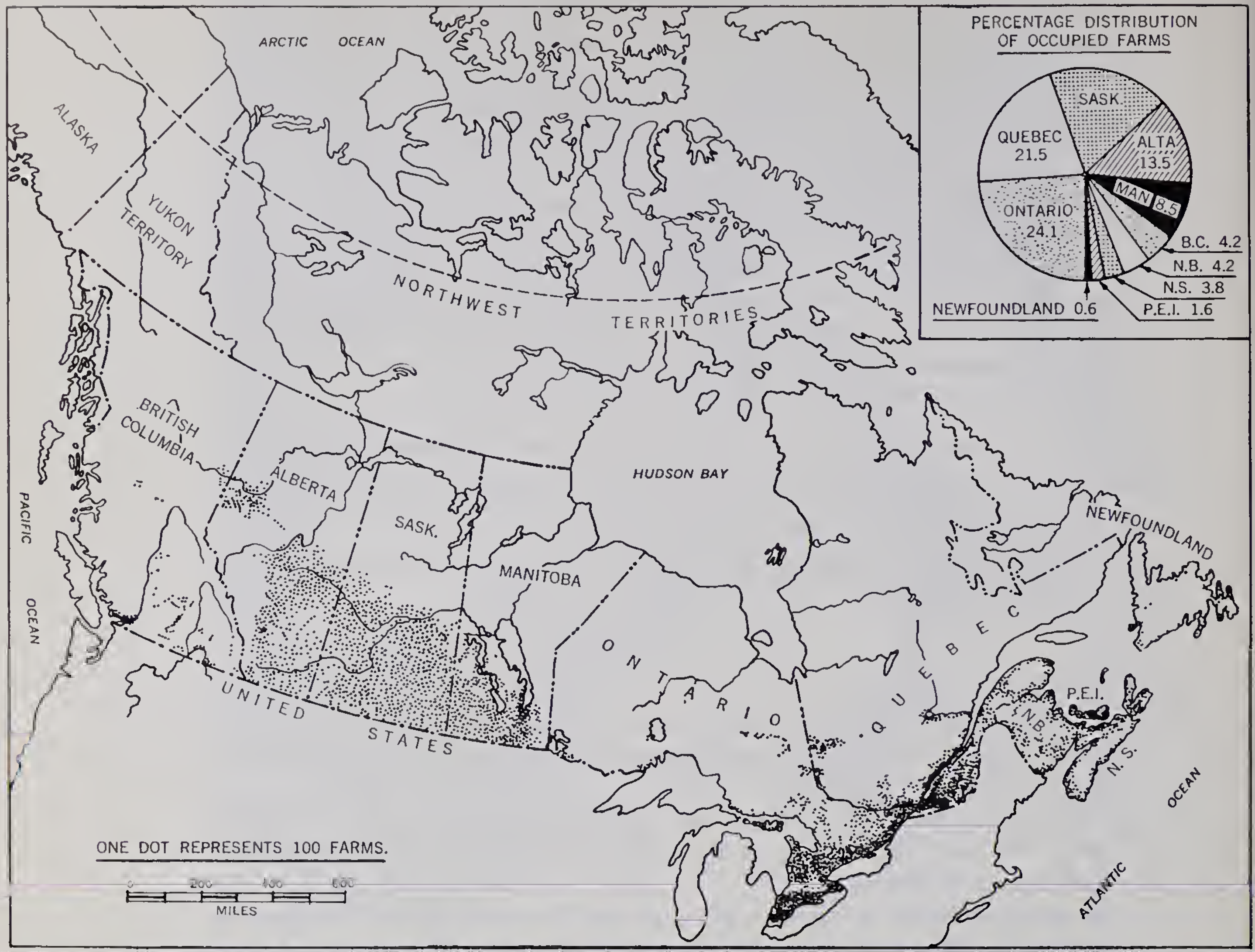
(a) How does the distribution compare with that for population shown in Figure 1—15? How does it compare with the "types of farming" map shown in Figure 11—3?

(b) Compare the total number of farms in the Prairie Provinces with the number in Quebec and Ontario. Which of these two regions has more land under cultivation? What does this suggest about the relative sizes of farms in the two regions?

(c) Describe the distribution of farms in the Atlantic Provinces and British Columbia.

FISHING IN CANADA

Study the maps of fisheries, shown in Figure 5-14 for the eastern provinces, and in Figure 9-23 for British Columbia. What are the most valuable species caught in each region? What natural conditions make the coasts of the Atlantic and Pacific oceans among the best fishing

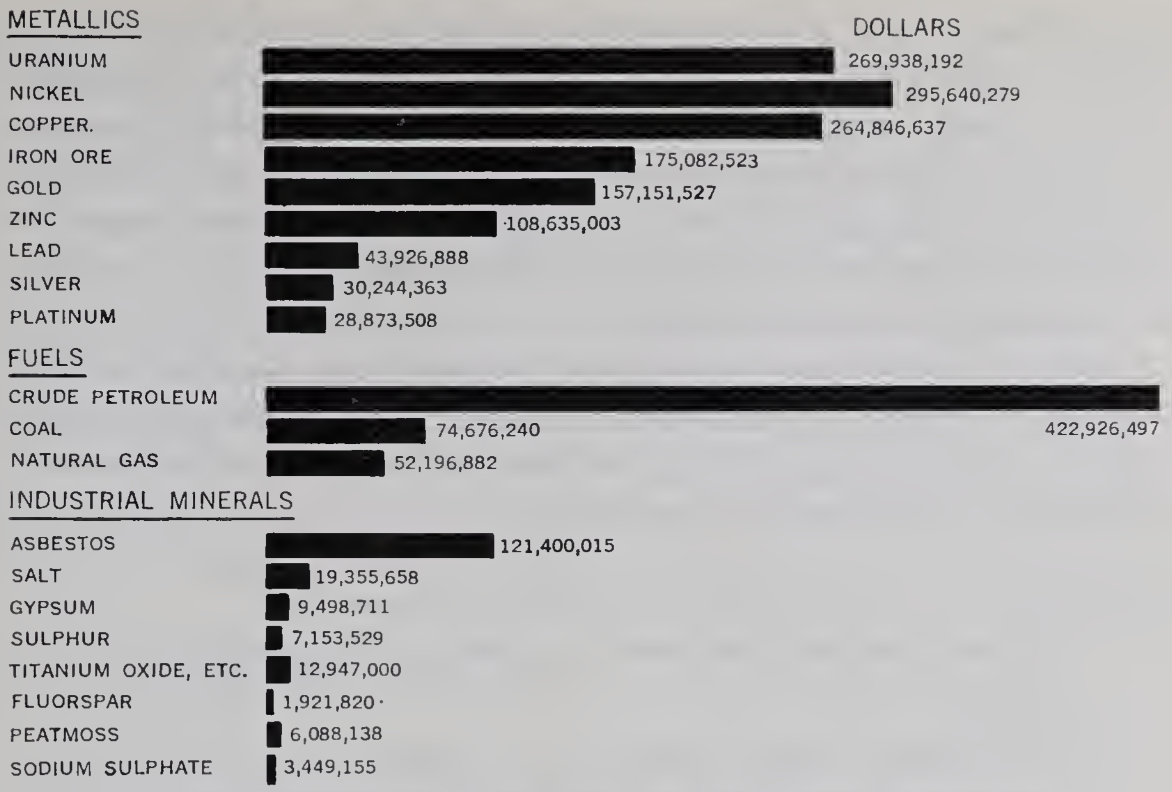


11—4 Occupied farms in Canada in 1951 (after the **Atlas of Canada**)

grounds in the world? Where are the chief inland fisheries of Canada found? Whitefish and yellow pickerel are the most important catches in interior waters.

MINING IN CANADA (Figures 11-5 and 11-6)

1. (a) What three classifications are used for mineral production, according to Figure 11—5?
(b) What was the leading metallic mineral produced by value in 1960? Name three other metals of importance.
(c) Name the province or provinces that lead in the production of each metal shown in Figure 11—5.
(d) Which province accounts for the bulk of Canada's petroleum output? Why is coal production now so much less important than petroleum production? Which provinces produce most of the nation's coal? What are the chief uses of oil, natural gas, and coal?
2. (a) Name the leading province in total value of mineral production in 1960, according to Figure 11—6.
(b) What proportion of the total output was accounted for by the two leading provinces? Name two other provinces of importance.



11—5 Value of mineral production in Canada in 1960

Province or Territory	Metals	Fuels	Industrial Minerals	Total for Prov. or Territory	Per cent of total
Newfoundland	78,925,679	—	7,711,444	86,637,123	3.5
P.E.I.	—	—	1,172,587	1,172,587	.02
Nova Scotia	102	44,981,257	20,472,172	65,453,531	2.6
New Brunswick	—	8,834,749	8,237,990	17,072,739	.28
Quebec	224,294,082	—	221,908,644	446,202,726	17.9
Ontario	817,803,023	9,724,055	155,577,334	983,104,412	39.4
Manitoba	29,904,851	10,690,384	18,107,462	58,702,697	2.4
Saskatchewan	84,187,425	112,950,194	14,955,606	212,093,225	8.9
Alberta	6,501	362,528,938	32,808,571	395,344,010	15.9
British Columbia	131,721,707	15,391,658	39,148,281	186,261,646	7.5
N.W. Territories and Yukon Territory	39,714,691	750,594	—	40,465,285	.6
Canada	1,406,558,061	565,851,829	520,100,091	2,492,509,981	100.0

11—6 Value of mineral production in Canada by provinces in 1960 (after **Canada Year Book,** 1962)

(c) Which minerals make up the major part of the output of the four provinces that you have named?
(d) Name one mineral of importance produced in each of the other provinces and territories shown in the list.
3. Review the maps in this book that show where the minerals are produced in each province or region. Where possible, describe the relationship of the rock structures to the kind and quality of minerals produced.

Minerals, especially base metals, make up one of Canada's basic exports and are therefore a source of our high standard of living. They comprise, however, what geographers call a "non-renewable" resource. It is foolish to apply such words as "unlimited" and "inexhaustible" to our mineral wealth. Nevertheless, Canada undoubtedly contains vast reserves of untapped or undiscovered wealth. Name some untapped mineral wealth known to you. Why has it not been tapped as yet? Where are future discoveries likely to be made? How can we best conserve our mineral wealth?

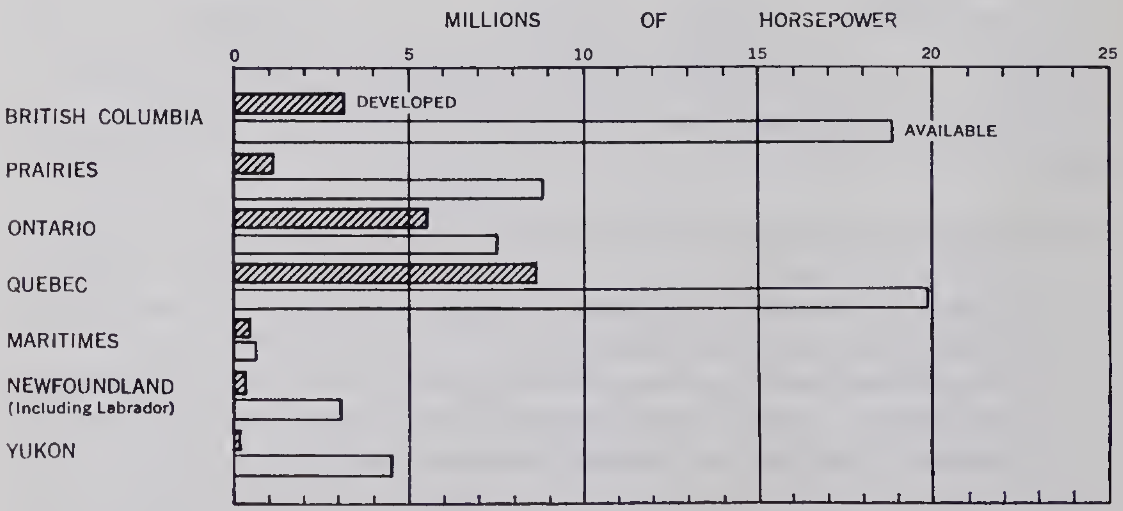
Although petroleum and natural gas are now Canada's leading sources of energy, water power is also of major importance, partly because it is inexhaustible. More than 90 percent of the nation's electricity is produced from water power.

CANADA'S WATER-POWER WEALTH (Figure 11-7)

1. (a) Which province leads Canada in developed water power?
(b) What proportion of the nation's total production is accounted for by this province?
(c) Which province ranks second in developed water power?
2. (a) Where is most of the water power in the two leading provinces found?
(b) Why is the region so rich in water-power resources?
(c) Name three major centres of hydro-electricity production within the Great Lakes-St. Lawrence Lowlands.
3. (a) Which province leads Canada in **available** water power?
(b) Which one ranks second?
(c) Note the large available resources in the Prairie Provinces. Where are the main water-power resources of this region located?
(d) Where else are there large undeveloped water-power resources?

MANUFACTURING INDUSTRIES

Only ten percent of all electricity produced in Canada is for domestic (residential) use. Most of the rest is used by a few large industries, such as, pulp and paper manufacturing, smelting and refining, and



11—7 Available and developed water power in Canada in 1957 (American Geographical Society issue of **Focus**) the manufacture of chemicals. These remind us that Canada has become an important manufacturing nation. Although some of the largest industries are located in or near the Canadian Shield where abundant water power is available, most manufacturing is concentrated in a few small areas in the southern part of the country, especially around the major cities. More than three quarters of Canada's manufacturing industries are concentrated in southern Quebec and southern Ontario. What sources of power are available there? Explain why this small region produces most of Canada's manufactured goods. Describe important industries found at each of the following centres in other parts of the country: Sydney, Halifax, Saint John, Sault Ste. Marie, Winnipeg, Regina, Edmonton, Calgary, Vancouver.

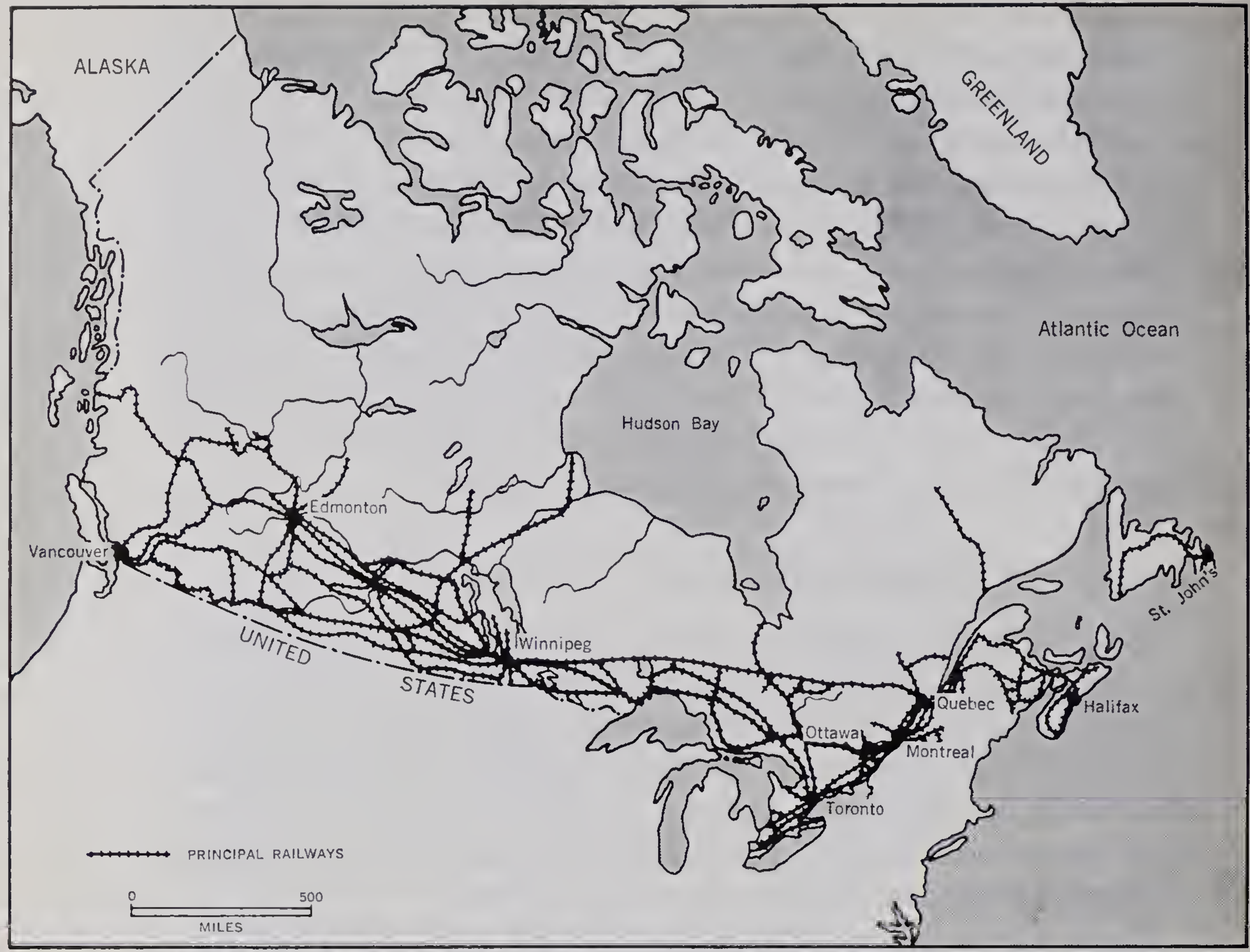
MEANS OF TRANSPORTATION

A nation as large as Canada must have good systems of transportation in order to move people and goods efficiently. Figure 1-1 shows the Trans-Canada Highway and other main roads in Canada, but these are only a small fraction of the many thousands of miles of roads. Road maps of the various provinces obtained from service stations show the networks in detail. Plan a cross-Canada tour using such maps and describe the scenery along your chosen route.

Figure 11-8 is a map of Canada's railways. Again, it is not very detailed, but the two large railway companies can supply more detailed maps. As you study Figure 11-8, note especially the cities that are important junctions of railway routes. Trace, too, the routes of the important railways into Canada's northland. In each case, explain why the line was built.

Although more people now travel by automobile than by rail, the railways remain, in many ways, the most important carriers of Canada's goods. This applies especially to so-called bulk goods (wheat, coal, mineral ores, pulpwood, etc.) on which Canada's industries and trade are so dependent. Why is it more economical to carry iron ore by rail than by road?

The tremendous importance of water transportation in Canada has already been stressed, but it is well to re-emphasize it. In which part of the country is inland water transportation of greatest importance? Again, note the importance of shipping in moving bulk goods. It is cheaper to move a cargo of wheat by water than by any other means. What is the greatest limitation on Canada's inland water transport systems? Coastal and overseas water routes are of immense importance to our trade. Canada, because it spans North America, is in a good

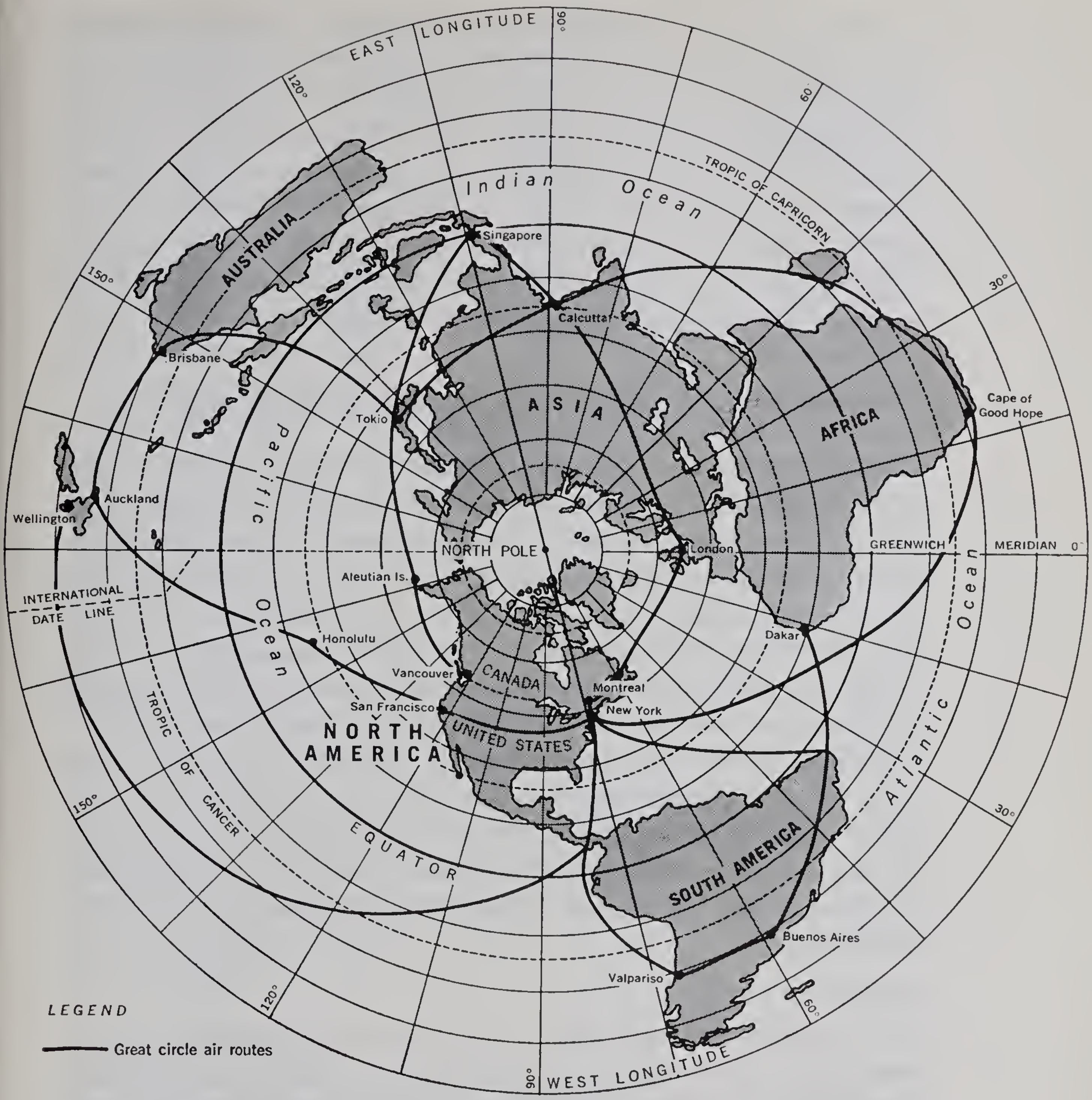


11—8 The main railways of Canada

position to trade with both Europe and Asia, the home of more than two thirds of the world's people.

Pipelines were discussed in Chapter 8. Review Figures 8-24 and 8-25 in that chapter on pages 351-352. Increasing sales of natural gas and oil to the United States have stimulated the construction of more pipelines.

Air transport is of tremendous importance in a nation as large as Canada. The journey from Montreal to Vancouver, which takes a week or more by automobile and three days by rail, can be accomplished in only six hours by jet aircraft. Because of the time-zone differences, it is possible to have breakfast in Montreal and to catch a plane at 7 a.m. (Eastern Standard Time), arriving in Vancouver at 10:15 a.m. (Pacific Standard Time), just in time for mid-morning coffee. The role of the airplane in opening up the northland has been discussed in previous chapters. Because so many international air routes pass over or near the North Pole, Canada's northland is of special importance in our air age. Some of the main routes are shown in Figure 11—9.



11—9 Canada in its world setting showing major air routes

FOREIGN TRADE

Few nations in the world are more dependent than Canada on foreign trade. Why is this? Figure 11—10 shows world trade by leading countries. It is one of the most significant tables in this book. "Total trade" means imports plus exports. How did Canada rank in total trade among the nations in 1961? "Per capita" trade means the amount of total trade carried on per head of population. Again, Canada ranks near the top of the list.

Country	Total trade in U.S. $ '000,000	Population 1961 in '000	Trade per capita in U.S. $
United States	37,027	184,735	200
West Germany	23,638	56,667	417
United Kingdom	23,072	52,825	437
France	13,901	46,241	301
Canada	12,315	18,238	675
Japan	10,046	94,420	106
Italy	9,410	49,773	189
Netherlands	9,375	11,720	800
Belgium and Luxembourg	8,143	9,493	858
Sweden	5,659	7,542	750

11—10 World trade by leading countries in 1961 (after **Canada Year Book**, 1962)

Many of the goods imported by Canada are needed as food, as fuel, as raw materials for our industries, and for other purposes. Some Canadian industries depend largely or completely on imported raw materials. Make a list of ten such goods that Canada imports. Indicate the country (or countries) from which each comes. What use do we make of each? Where in Canada is each processed or consumed?

What are Canada's ten major exports? Answers to this and some preceding questions may be found in a recent *Canada Year Book.*

The greater part of Canada's trade is carried on with the United States. We export more goods to that country than to any other. We buy more goods in the United States than in any other. In fact, the two nations are each other's best customer. Name five important goods that Canada sells to the United States. Name five that we buy in the United States.

CONSERVATION

Conservation of our resources is a basic national concern. Many Canadians feel that we must be very careful not to trade too many of our resources away. However, Canada must trade in order to live. We have far more resources than we can use. Canada cannot live unto itself alone and there is no reason why we cannot manage our resources wisely. In doing so, it is essential that we practise wise conservation measures. Lumber is one of Canada's chief exports. Today, we have begun to conserve our forests more wisely than in the past so that we can be assured of a permanent supply of lumber in the future.

EXTERNAL RELATIONS

Because Canada is so dependent on foreign trade, it is important that we co-operate with other nations. We can hardly expect to find a market for our goods if we close our doors to other nations. Many

Japanese goods are sold in Canada. Yet Japan buys *two times* as many goods from us as we buy from her. Canada has special trading arrangements with the United Kingdom and other Commonwealth nations. Our overseas and United States markets are dependent on sensible arrangements and good will in our relations with others. One purpose of this book is to make Canadians aware of their dependence on others. If the United Kingdom and Japan, for example, stopped buying Canadian wheat and if the United States reduced its imports of our lumber by half, many thousands of Canadians would be thrown out of work immediately.

Of serious concern to many Canadians is the fact that a large proportion of our resources and industries are owned outside the country. United States and British interests, for example, own the greater part of our mineral resources. Many pulp and paper mills are entirely owned by foreign companies. In order to build up our industries, it has been necessary to spend a great deal of money. The capital as it is called, has not always been available in Canada, partly because of the small population. In addition, Canadians have often seemed less willing than foreigners to invest in their own country. Some Canadians have complained that profits, made from our resources, have flowed out of the country and been of no benefit to ourselves. It is claimed, too, that Canadians have not always had fair opportunities to invest and to hold high positions in foreign-controlled companies. If these facts are true, it is partly because Canadians have not always looked after their own interests. In recent years, our government has passed laws to ensure that foreign companies are more carefully controlled than in the past.

CANADIAN UNITY

Because Canada is so large, has such a small population, and contains so many geographical barriers, it has always been necessary to make special efforts to keep the country united. The Canadian Pacific Railway was originally built to guarantee entry of British Columbia into Confederation, to keep the West Canadian, and to unite the nation by means of a band of steel. The Canadian Broadcasting Corporation was established partly to promote a greater feeling of unity among Canadians. The hockey broadcasts that come from Montreal or Toronto every Saturday night during the winter months are seen or heard from St. John's to Victoria and are also broadcast as far north as the Yukon. Nowhere else in the world is an event of nationwide interest transmitted regularly over such a vast area.

In some cases, great enterprises have been undertaken by the government because no other Canadian source of capital has been available. The St. Lawrence Seaway and the South Saskatchewan Dam are examples of such projects.

WORLD POSITION

Canada's trade relations are only part of her relationships with other nations. In Chapter 1, we mentioned her position between the two great world powers. This is well shown in Figure 11–9. This map shows clearly that Canada and Russia are near neighbors across the North Pole. Our long, undefended border with the United States is famous throughout the world. It is obvious that in any conflict between the great powers, Canada would be a battleground. Therefore, it is of interest to Canada to promote world peace. Canada, as a member of the United Nations, has often taken the lead in doing this. Canada also extends millions of dollars worth of aid every year to foreign countries. We have important ties with countries of Asia because we sell wheat and other goods to China and Japan and because we extend aid to India, Pakistan, and Ceylon. These countries, like Australia and New Zealand, are fellow members of the British Commonwealth. This huge association of nations is an important factor in maintaining world peace. Many of its members in Africa maintain close trade and other relations with Canada. In 1962, there were nearly 8000 overseas students in Canadian universities, most of them from countries of the Commonwealth.

Canada carries on more trade with the United Kingdom than with any other country except the United States. Millions of Canadians are descendants of people who were born in England, Scotland, Wales, and Ireland. In recent years, the nations of Europe have been cooperating together more closely. Six of them have formed the European Common Market. Canada trades with all these countries. One of them — France — was the original home of the first white settlers in Canada. Today, their French-Canadian descendants form about 30 percent of the population of Canada. Most of them live in Quebec, but French Canadians are found in all provinces. Increasing numbers of English-speaking Canadians are learning to speak French and more schools than ever before are teaching this other official language of our country.

Although the United Kingdom and France were the ancestral homes of most Canadians living today, all European nations and some Asiatic lands have contributed people to Canada. This has been a source of strength for it has helped to make us a nation with a great variety of skills and talents.

In Chapter 1, seven questions were suggested on page 17 for study throughout this book. Some of these have been answered in the present chapter. Our study of Canada has by no means ended. It never will end, for there will always be great problems for us to solve. We can never be sure what the future will bring. But we can be sure that it will be a good future only if Canadians learn to manage their resources wisely, to take pride in the beautiful country they have inherited, and try to live in harmony with their neighbors at home and everywhere throughout the world.

The conclusion to this book is to suggest that a study of Canada's land and people is fascinating. The intricate pattern of settlement, activity, and growth is understandable, sensible, and interesting. There is a close and very important connection between the kind of place where people live and the type of activity and occupation in which they engage. Place conditions make an important difference to the way in which people live. This is what is meant by geography. We can never fully understand how Canada will develop, how our resources should be used, or how we should act in relation to other nations, unless we know the geography of our own land very thoroughly. International peace and understanding begin at home by learning to appreciate how our neighbors in our district, province, and nation have learned to use what nature has provided. Canadians live and do what they do where they do it for good and understandable reasons. These reasons can be discovered by the kind of investigations suggested and the materials provided by this book.

TABLE 1

The Provinces and Territories of Canada: areas, populations, population densities, and other data
(Dominion Bureau of Statistics)

Province or Territory	Area (Land and Water) sq. miles	Percent of Canada's Area	Population (1956 Census)	Population (1961 Census)	Population Density* per sq. mi.	Percent of Canada's Population**
Newfoundland (incl. Labrador)	156,185	4.1	415,074	457,853	3.20	2.51
Prince Edward Island	2,184	0.1	99,285	104,629	47.90	0.57
Nova Scotia	21,425	0.6	694,717	737,007	36.12	4.04
New Brunswick	28,354	0.7	554,616	597,936	20.76	3.28
Quebec	594,860	15.4	4,628,378	5,259,211	10.03	28.84
Ontario	412,582	10.7	5,404,933	6,236,092	18.12	34.20
Manitoba	251,000	6.5	850,040	921,686	4.34	5.05
Saskatchewan	251,700	6.5	880,665	925,181	4.20	5.07
Alberta	255,285	6.6	1,123,116	1,331,944	5.35	7.30
British Columbia	366,255	9.5	1,398,464	1,629,082	4.53	8.93
Yukon Territories	207,076	5.4	12,190	14,628	0.06	0.08
Northwest Territories	1,304,903	33.9	19,313	22,998	0.02	0.13
CANADA	3,851,809	100.0	16,080,791	18,238,247	5.12	100.00

*Based on 1961 Census and calculated according to land area only

**Based on 1961 Census

TABLE 2A

Incorporated cities and towns in Canada having more than 35,000 people according to the 1961 Census
(Dominion Bureau of Statistics)

City and Province	Year of Incorporation as city	Population 1961	City and Province	Year of Incorporation as city	Population 1961
Brantford, Ont.	1877	55,201	Port Arthur, Ont.	1907	45,276
Burlington, Ont.	1914*	47,008	Quebec, Que.	1832	171,979
Calgary, Alta.	1893	249,641	Regina, Sask.	1903	112,141
Cornwall, Ont.	1945	43,639	St. Boniface, Man.	1908	37,600
Dartmouth, N.S.	1961	46,966	St. Catharines, Ont.	1876	84,472
Edmonton, Alta.	1904	281,027	Saint John, N.B.	1785	55,153
Fort William, Ont.	1907	45,214	St. John's, Nfld.	1888	63,633
Guelph, Ont.	1879	39,838	St. Laurent, Que.	1955	49,805
Halifax, N.S.	1841	92,511	St. Michel, Que.	1952	55,978
Hamilton, Ont.	1846	273,991	Sarnia, Ont.	1914	50,976
Hull, Que.	1875	56,929	Saskatoon, Sask.	1906	95,526
Jacques-Cartier, Que.	1951	40,807	Sault Ste. Marie, Ont.	1912	43,088
Kingston, Ont.	1846	53,526	Sherbrooke, Que.	1875	66,554
Kitchener, Ont.	1912	74,485	Sudbury, Ont.	1930	80,120
Lachine, Que.	1909	38,630	Three Rivers, Que.	1857	53,477
Lethbridge, Alta.	1906	35,454	Toronto, Ont.	1834	672,407
London, Ont.	1855	169,569	Vancouver, B.C.	1886	384,522
Moncton, N.B.	1890	43,840	Verdun, Que.	1912	78,317
Montreal, Que.	1832	1,191,062	Victoria, B.C.	1862	54,941
Montreal North, Que.	1915	48,433	Welland, Ont.	1917	36,079
Oshawa, Ont.	1924	62,415	Windsor, Ont.	1892	114,367
Ottawa, Ont.	1854	268,206	Winnipeg, Man.	1873	265,429
Peterborough, Ont.	1905	47,185			

*Not yet a city. It was incorporated as a town in 1914.

TABLE 2B

The seventeen metropolitan areas of Canada: Population of each, 1961 Census (Dominion Bureau of Statistics)

Metropolitan Area	Population, 1961	Metropolitan Area	Population, 1961
Calgary, Alta.	279,062	Saint John, N.B.	95,563
Edmonton, Alta.	337,568	St. John's, Nfld.	90,838
Halifax, N.S.	183,946	Sudbury, Ont.	110,694
Hamilton, Ont.	395,189	Toronto, Ont.	1,824,481
Kitchener, Ont.	154,864	Vancouver, B.C.	790,165
London, Ont.	181,283	Victoria, B.C.	154,152
Montreal, Que.	2,109,509	Windsor, Ont.	193,365
Ottawa, Ont.	429,750	Winnipeg, Man.	475,989
Quebec, Que.	357,568		

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